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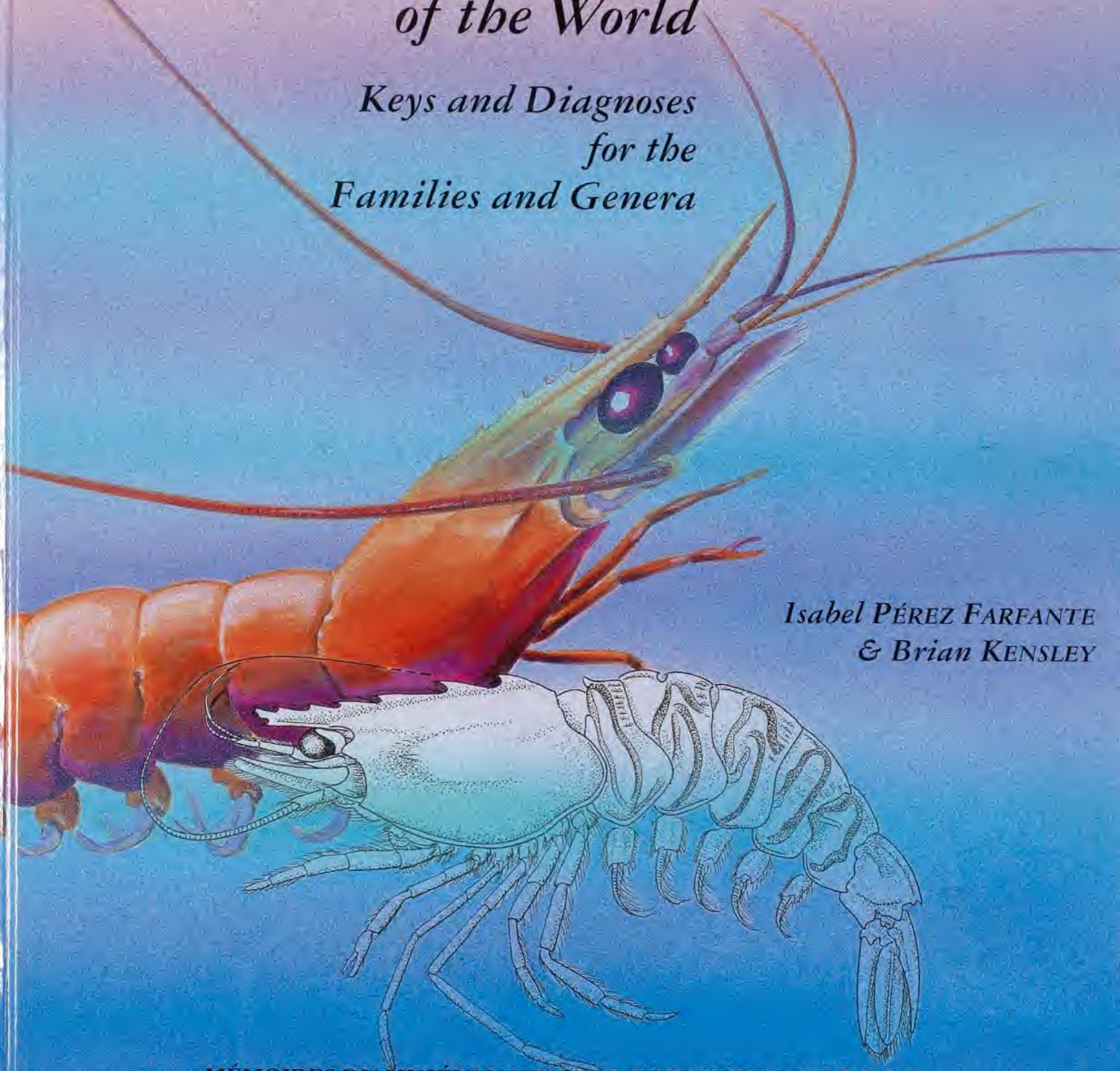
Penaeoid and Sergestoid Shrimps and Prawns of the World

Keys and Diagnoses for the Families and Genera



Isabel PÉREZ FARFANTE
& Brian KENSLEY

MÉMOIRES DU MUSÉUM NATIONAL D'HISTOIRE NATURELLE
TOME 175
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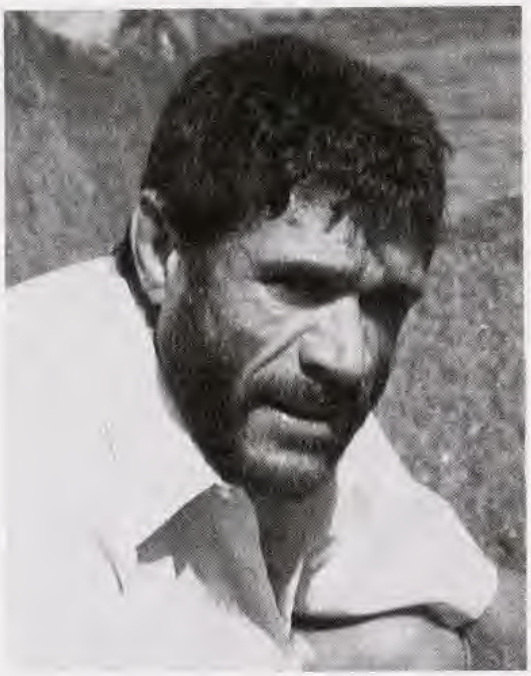
Dr Isabel PÉREZ FARFANTE was for 20 years, until 1986, a Research Scientist in the Systematics Laboratory of the National Marine Fisheries Service, National Oceanographic and Atmospheric Administration, based at the National Museum of Natural History, Smithsonian Institution, Washington, D.C. She continues her research as an Emeritus Research Scientist with the National Marine Fisheries Service in Miami, Florida. Concurrently, she was (and still is) a Research Associate of the National Museum of Natural History. Prior to 1961 she was Professor of Zoology at the Universidad de La Habana and Director of the Centro de Investigaciones Pesquesas de Cuba. A scientist with broad biological interests, the penaeoid shrimps of the world have occupied the prime position in her research.



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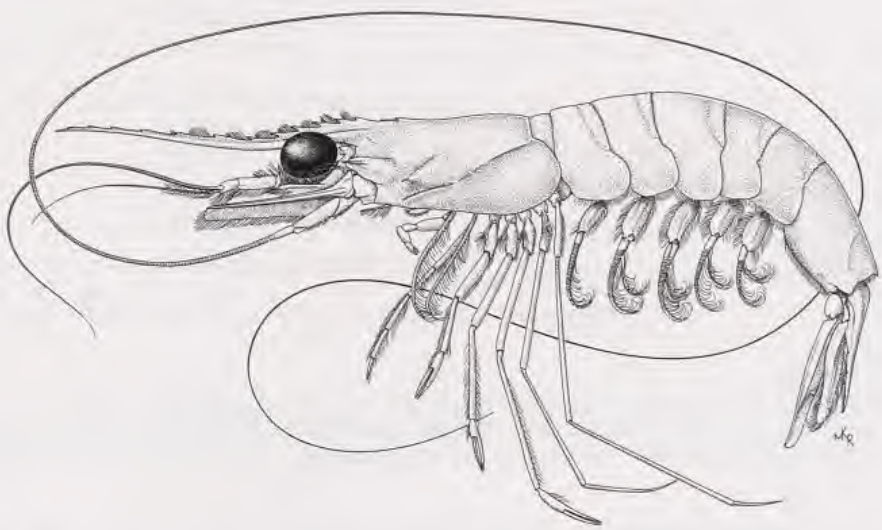
Penaeoid and Sergestoid Shrimps and Prawns of the World

Keys and Diagnoses for the Families and Genera



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MÉMOIRES DU MUSÉUM NATIONAL D'HISTOIRE NATURELLE

TOME 175
ZOOLOGIE

Penaeoid and Sergestoid Shrimps and Prawns of the World
Keys and Diagnoses for the Families and Genera

Isabel PÉREZ FARFANTE* & Brian KENSLEY**

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CONTENTS

ABSTRACT/RÉSUMÉ 9

EXTENDED ABSTRACT/RÉSUMÉ DÉVELOPPÉ 11

INTRODUCTION 15

Notes on the Format of the Text and Illustrations 16

Abbreviations 17

Acknowledgements 17

GLOSSARY 19

SYSTEMATIC SECTION 31

Suborder Dendrobranchiata 31

Superfamily Penaeoidea 31

Family Aristeidae 32

Family Benthesicymidae 56

Family Penaeidae 67

Family Sicyoniidae 152

Family Solenoceridae 157

Superfamily Sergestoidea 182

Family Luciferidae 183

Family Sergestidae 185

REFERENCES 203

INDEX 225

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ABSTRACT

PÉREZ FARFANTE, I. & KENSLEY, B. F., 1997. — Penaeoid and Sergestoid Shrimps and Prawns of the World. Keys and Diagnoses for the Families and Genera. *Mém. Mus. natn. Hist. nat.*, **175**: 1-233. Paris ISBN: 2-85653-510-0.

Keys for the determination of seven families, and 56 genera of Penaeoidean and Sergestoidean shrimps are provided, along with diagnoses of these taxa. The Penaeoidean families are: Aristeidae, Benthesicymidae, Penaeidae, Sicyoniidae, and Solenoceridae; the Sergestoidean families are: Luciferidae and Sergestidae. Three new genera are diagnosed: *Austropenaeus* gen. nov. (family Aristeidae), *Megokris* gen. nov. and *Rimapenaeus* gen. nov. (family Penaeidae). *Pelagopenaeus*, (family Penaeidae), a name originally proposed by BURKENROAD (1934), is given nomenclatural availability. The earlier names *Aristaeopsis* Wood-Mason, 1891 (family Aristeidae) and *Trachysalambria* Burkenroad, 1934 (family Penaeidae) are resurrected. The subgenera *Farfantepenaeus*, *Fenneropenaeus*, *Litopenaeus*, *Marsupenaeus*, and *Melicertus* are raised to full genera. In addition to diagnoses for the families and genera, a section on synonymy for each taxon includes references that have contributed to our understanding of the taxa. For each genus, a list of its currently recognized species and subspecies, along with author and date of publication, and distributional records is given. These lists include about 500 species. A reference is provided in the bibliography for every author and date mentioned in the text. An illustrated glossary explains the terms used in the diagnoses. At least one species of each genus (often the type species) is illustrated, along with figures of diagnostic features such as the petasma, thelycum, and seminal receptacles.

RÉSUMÉ

PÉREZ FARFANTE, I. & KENSLEY, B. F., 1997. — Les crevettes pénéides et sergestides du monde. Clés d'identification et diagnoses des familles et des genres. *Mém. Mus. natn. Hist. nat.*, **175** : 1-233. Paris ISBN : 2-85653-510-0.

Des clés pour l'identification des sept familles et des 56 genres de crevettes pénéides et sergestides sont fournies de même que des diagnoses de ces divers taxons. Les Pénéides comprennent cinq familles : Aristeidae, Benthesicymidae, Penaeidae, Sicyoniidae et Solenoceridae, les Sergestides deux : Luciferidae et Sergestidae. Trois genres nouveaux sont décrits : *Austropenaeus* gen. nov. (famille Aristeidae), *Megokris* gen. nov. et *Rimapenaeus* gen. nov. (famille Penaeidae). *Pelagopenaeus* (famille Penaeidae), un nom proposé à l'origine par BURKENROAD, est validé du point de vue nomenclatorial. Les anciens noms *Aristaeopsis* Wood-Mason, 1891 (famille Aristeidae) et *Trachysalambria* Burkenroad, 1934 (famille Penaeidae) sont ressuscités. Les sous-genres *Farfantepenaeus*, *Fenneropenaeus*, *Litopenaeus*, *Marsupenaeus*, et *Melicertus* sont élevés au rang de genre. En complément aux diagnoses des familles et des genres, les synonymies et les références des travaux ayant contribué à notre connaissance des taxons considérés sont citées. Pour chaque genre, la liste des espèces et sous-espèces couramment admises, avec leurs auteurs, la date de leur description et leur répartition géographique, est fournie. L'ensemble de ces listes mentionne environ 500 espèces. Les références complètes de tous les travaux cités dans le texte sont fournies en fin de travail. Un glossaire illustré explique les termes utilisés dans les diagnoses. Au moins une espèce de chaque genre (souvent l'espèce-type) est illustrée en entier avec, en outre, des dessins représentant des caractères distinctifs tels que le pétasma, le thélycum et les vésicules séminales.

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EXTENDED ABSTRACT

This work presents a study of the taxonomy of the penaeidean shrimps of the world. This group of shrimps includes many of the commercially important marine species of the tropics and subtropics, as well as many of the species that constitute a major link in the food chain of the oceans. The Penaeidea are made up of two superfamilies, the Penaeoidea (families Aristeidae, Benthesicymidae, Penaeidae, Sicyoniidae, and Solenoceridae), and the Sergestoidea (families Luciferidae and Sergestidae). The genera in each of these families are listed in the table of the page 12.

Keys and diagnoses are provided for these two superfamilies and seven families, and for their 56 genera. For each of these genera, a synonymy, the type species, its type locality, and gender are given, along with a diagnosis, branchial formula, and a list of the species included in the genus. References are included in the synonymy if the work referred to contributes to an understanding of the diagnosis of the genus, or includes records that significantly extend the geographical range of the constituent species. The species and subspecies list of almost 500 names includes the author and date, and geographical records. Each genus is illustrated with a lateral view of a whole animal (usually the type species), petasma, thelycum, and seminal receptacles, structures which exhibit important diagnostic characters. Features used in the diagnoses are defined in a glossary; some of these are also illustrated. All references giving both author and date in the text are provided in full in the bibliography.

Three new genera are diagnosed: Austropenaeus *(family Aristeidae),* Megokris *and* Rimapenaeus *(family Penaeidae).* Austropenaeus, *with its type and only species* A. nitidus *Barnard, 1947 (previously placed in* Plesiopenaeus*) is characterized by having a reduced podobranch on the third pereopod, a modified ventral antennular flagellum and*

RÉSUMÉ DÉVELOPPÉ

Ce travail porte sur la taxonomie des crevettes pénéides du monde, groupe renfermant de nombreuses espèces marines des régions tropicales et subtropicales importantes du point de vue commercial, ainsi que de nombreuses espèces jouant un rôle primordial dans la chaîne alimentaire des océans.

Les Penaeidea comprennent deux superfamilles, les Penaeoidea avec les familles Aristeidae, Benthesicymidae, Penaeidae, Sicyoniidae et Solenoceridae et les Sergestoidea avec les familles Luciferidae et Sergestidae. Les genres compris dans chacune de ces familles sont indiqués dans le tableau de la page 12.

Des clés d'identification et des diagnoses sont proposées pour ces deux superfamilles, ces sept familles et les 56 genres qui s'y trouvent. Pour chacun des genres, les synonymes, l'espèce-type, la localité-type et le genre grammatical sont indiqués, avec en outre une diagnose, la formule branchiale et une liste des espèces comprises dans le genre. Les références bibliographiques correspondent à des travaux qui, soit permettent une meilleure compréhension du genre, soit indiquent de nouvelles récoltes qui élargissent de manière significative la répartition de certaines des espèces du genre. Les espèces et sous-espèces citées sont près de 500; pour chacune sont indiqués son auteur, la date de sa description et sa répartition géographique. Chaque genre est illustré par la vue latérale d'une crevette entière (habituellement l'espèce-type), le pétasma, le thélycum et, souvent, les réceptacle séminaux, structures qui fournissent des caractères d'identification importants. Les caractères utilisés dans les diagnoses sont définis dans un glossaire et beaucoup sont illustrés. Toutes les références mentionnées dans le texte sont citées in extenso à la fin du volume.

Trois nouveaux genres sont décrits : l'un, *Austropenaeus*, appartenant à la famille

Source : MNHN, Paris

Superfamily PENAEOIDEA

Family ARISTEIDAE

Aristaeomorpha
Aristaeopsis
Aristeus
Austropenaeus
Hemipenaeus
Hepomadus
Parahepomadus
Plesiopenaeus
Pseudaristeus

Family BENTHESICYMIDAE

Bentheogennema
Benthesicymus
Benthonectes
Gennadas

Family PENAEIDAE

Artemesia
Atypopenaeus
Farfantepenaeus
Fenneropenaeus
Funchalia
Heteropenaeus
Litopenaeus
Macropetasma
Marsupenaeus
Megokris
Melicertus
Metapenaeopsis
Metapenaeus
Miyadiella
Parapenaeopsis
Parapenaeus
Pelagopenaeus
Penaeopsis
Penaeus
Protrachypene
Rimapenaeus
Tanypenaeus
Trachypenaeopsis
Trachypenaeus
Trachysalambria
Xiphopenaeus

Family SICYONIIDAE

Sicyonia

Family SOLENOCERIDAE

Cryptopenaeus
Gordonella
Hadropenaeus
Haliporoides
Haliporus
Hymenopenaeus
Mesopenaeus
Pleoticus
Solenocera

Superfamily SERGESTOIDEA

Family LUCIFERIDAE

Lucifer

Family SERGESTIDAE

Acetes
Peisos
Petalidium
Sergestes
Sergia
Sicyonella

Families and genera in the superfamilies Penaeoidea and Sergestoidea
Familles et genres des superfamilles Penaeoidea et Sergestoidea

Source : MNHN, Paris

modified third maxilliped in the male, and feebly developed carapace carinae. Megokris *is separated from* Trachypenaeus *s.l., and is characterized by features of the thelycum, by the seminal receptacles being connected neither by a transverse groove nor by a median pocket, and by the features of the petasma.* Rimapenaeus *is also part of the complex of genera previously known as* Trachypenaeus *s.l., and is characterized by features of the thelycum and especially of the internal trilobed seminal receptacles, and by the characters of the petasma.*

Pelagopenaeus *(family Penaeidae) a name originally proposed by* BURKENROAD *(1934), but not valid, no type species having been designated, is given nomenclatorial validity.*

The generic names Aristaeopsis *Wood-Mason, 1891, and* Trachysalambria *Burkenroad, 1934, are resurrected. The former, with its type and only species* A. edwardsiana, *is characterized by the absence of exopods on the first to fifth pereopods, the presence of a rounded middorsal carina on the second abdominal somite, a sharp middorsal carina on the third abdominal somite, a modified antennal scaphocerite in the male, and by the absence of a distal meral spine on the first and second pereopods.* Trachysalambria, *one of the complex of genera formerly under* Trachypenaeus *s.l., is characterized by the features of the thelycum and petasma, in having bilobed seminal receptacles opening into a common groove, and in having a short longitudinal suture on the carapace.*

Five subgenera of Penaeus are raised to generic level, namely Farfantepenaeus, Fenneropenaeus, Litopenaeus, Marsupenaeus *and* Melicertus.

Aristeidae, les deux autres, *Megokris* et *Rimapenaeus*, à la famille Penaeidae.

Austropenaeus, qui ne comprend actuellement qu'une seule espèce, *A. nitidus* Barnard, 1947 (précédemment placée dans le genre *Plesiopenaeus*) se caractérise par une podobranchie de taille réduite sur les troisièmes péréiopodes, un flagelle antennulaire ventral et des troisièmes maxillipèdes modifiés chez le mâle, des carènes faiblement marquées sur la carapace. *Megokris* se sépare des *Trachypenaeus* s.l. et s'en distingue par certains caractères du thélycum, les réceptacles séminaux qui ne sont connectés entre eux ni par un sillon transversal ni par une poche médiane, et les caractères du pétasma. *Rimapenaeus* fait également partie du complexe *Trachypenaeus* s. l. et se distingue par la disposition du thélycum, des réceptacles séminaux trilobés et les caractères du pétasma.

Pelagopenaeus, nom de genre proposé par BURKENROAD en 1934 mais qui n'était pas valide aucune espèce-type n'ayant été désignée, est validé.

Les genres *Aristaeopsis* Wood Mason, 1891, et *Trachysalambria* Burkenroad, 1934, sont ressuscités. Le premier, avec pour unique espèce *A. edwardsiana*, se caractérise par l'absence d'exopodes sur les cinq paires de péréiopodes, la présence d'une carène dorsale arrondie sur le deuxième segment abdominal, aiguë sur le troisième, un scaphocérite modifié chez le mâle, et l'absence d'une épine sur le mérus des premiers et seconds péréiopodes. *Trachysalambria*, l'un des genres du complexe autrefois désigné sous l'appellation *Trachypenaeus* s.l., se distingue par les caractères du thélycum et du pétasma, des réceptacles séminaux bilobés s'ouvrant dans un sillon commun, une courte suture longitudinale sur la carapace.

Cinq sous-genres de *Penaeus* sont élevés au rang de genre. Ce sont: *Farfantepenaeus*, *Fenneropenaeus, Litopenaeus, Marsupenaeus* et *Melicertus*.

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INTRODUCTION

Crustaceans including shrimps of various kinds have probably been a source of food for humans from very early times. Within historical times reference is made to shrimps in ancient Chinese and Japanese literature. The earliest known published description and figure of a penaeid shrimp in Western literature is that of *Melicertus kerathurus*, referred to by Guillaume RONDELET in his *Libri de Piscibus Marinis* of 1554 as *"Squilla Crangone"* (HOLTHUIS, in litt. 1996). In more modern scientific literature, the species now known as the American white shrimp, *Litopenaeus setiferus*, was referred to by SEBA (1759) as *Astacus fluviatilis Americanus*, and shortly thereafter, as *Cancer setiferus* by LINNAEUS (1767). By 1814, the Penaeoidea had been recognized as a taxonomic grouping by RAFINESQUE-SCHMALTZ. Since then, the literature on many aspects of the systematics and biology of this assemblage has grown enormously, not least because of the economic importance of many of the constituent species (see DALL *et al.*, 1990, for an extended taxonomic history of the Penaeoidea).

The term Dendrobranchiata, coined by BATE (1888) to distinguish a group of crustaceans from the Trichobranchiata and the Phyllobranchiata, originally included the Normalia (Penaeidae and Sergestidae) and the Aberrantia (Euphausiacea and Mysidacea). This division was based on BATE's interpretation of gill structure.

In the present-day conception of the Dendrobranchiata, seven families, 56 genera, and some 500 described species are recognized. Two families, the Penaeidae and Sicyoniidae, contain many of the shrimp species caught commercially in the tropics and subtropics around the world. The commercial shrimp catch for the United States alone in 1996 was valued at almost $463 million, representing about 14% of the total commercial fisheries catch, while the shrimp imports for the same year totalled $2.5 billion. For several countries, shrimp exports constitute a major source of foreign currency income. Given this economic significance, and the fact that penaeoideans occur in a wide variety of shallow-water marine and estuarine habitats, knowledge of the ecology, feeding, reproduction, life cycles, population dynamics, predation, and fisheries potential has vastly increased over the last three decades. In the Gulf of Mexico, penaeidean shrimps play an important role as the prey species for a variety of commercial fish species such as Atlantic croaker, silver perch, southern flounder, sand seatrout, spotted seatrout, and lizardfish (MINELLO and ZIMMERMAN, 1984; MINELLO *et al.*, 1989: 13; SHERIDAN *et al.*, 1984). Further, the commercial aquaculture production of a range of species has given an added impetus to research into these organisms. A thorough knowledge of the systematics of these shrimps is clearly an essential prerequisite for wise management and exploitation, and for placing the great body of biological knowledge in context.

As with many invertebrate groups, the morphology of the external and internal reproductive structures plays a fundamental role in interpreting the systematics of the Dendrobranchiata. This aspect of the biology of the group has received considerable attention, given the central role of reproduction in our understanding of fecundity, life histories, and exploitation of the group. Our own studies have led us to reinterpret especially thelycal structures, and in particular those of the seminal receptacles, a number of which had not previously been identified and which are described herein for the first time. Close attention to these latter structures has shown many earlier works to have erred in interpreting the nature of an 'open' and a 'closed' thelycum. The importance of these structures in the evolutionary success of the group has thus led us to pay

Source : MNHN, Paris

particular attention to the characters to be found in the reproductive morphology. Brief notes on the spermatophores of a number of genera are given. These structures, although having a similar basic pattern for each genus, may exhibit variation among congeneric species, as, for example, in the species of *Litopenaeus* (PÉREZ FARFANTE, 1975).

The three predominantly deepwater families, the Aristeidae, Benthesicymidae, and Sergestidae contain species that are either deep benthic dwellers or are members of the meso- and bathypelagic fauna of the oceans. Given their often great abundance in the water column, these forms play a major role in the food chain of the oceans, many being active predators, and in turn are the prey of many predatory fishes such as the various species of tuna (DRAGOVICH, 1969).

The species of the seventh family, the Luciferidae, are true planktonic forms. The relationship of this family to the rest of the Dendrobranchiata, however, is unclear, and is based on traditional usage rather than shared advanced characters.

In spite of the importance of the shallow and deepwater Dendrobranchiata, the taxonomy of the group has been unusually fluid and sometimes confused, with some genera poorly defined. This is particularly the case for several genera having their greatest diversity in the Indo-West Pacific region, e.g. *Parapenaeopsis*, for which no modern revision is available. Milestones of taxonomic significance for the penaeideans include the works of BATE (1888), KUBO (1949), BURKENROAD (1934a, 1934b, 1983), YALDWYN (1957), PÉREZ FARFANTE (1969, 1977a, 1980a, 1985), CROSNIER (1978, 1985, 1987, 1989, 1991, 1994a), and DALL *et al.* (1990), and those of HELDT (1938a, 1938b) and HUDINAGA (1942) on reproduction. Given this plethora of sources, we were prompted to draw together all relevant taxonomic works on the dendrobranchiates, and to add some of our own observations and data, to produce a single comprehensive reference that would serve as a basic tool in the systematics of the group. In this task we were inspired by the works of HOLTHUIS (1955a, 1993) on the Caridea, whose summations of taxonomic knowledge have proved to be indispensible in understanding that other large group of shrimps.

We have not considered the fossil history of the dendrobranchiates in this work. The poor quality of the available fossils, and their dubious taxonomy (often linked to modern taxa with no basis in real shared characters), pursuaded us that the paleontological evidence added little to our understanding of the extant forms.

As for larval forms, many of which have formal generic and specific designations but which have not been linked to adult forms, we decided not to deal with these (unless the adult connection has been made, in which case any taxonomic implications are of course taken into consideration), again because their uncertain systematic position would add little to our understanding of the adult systematics.

Notes on the Format of the Text and Illustrations

Superfamilies, families, genera within families, and lists of species are arranged alphabetically for ease of use. For convenience of usage, extended synonymies giving abbreviated journal titles are provided; the abbreviations for journals used are those of the *World List of Scientific Periodicals* (BROWN and STRATTON, 1963). Abbreviations for non-journal references are of our own devising, and are used consistently throughout. References are included that contribute to the definition of a taxon; mere mention of the taxon or of a geographic record did not warrant inclusion in the synonymy.

In the descriptions, the middorsal armature of the rostrum and carapace are consistently referred to as teeth, not spines, in spite of the confusion over the use of these two terms. Where carapace length is given, as in the legends to figures, this is measured from the orbital margin to the mid-dorsal posterior margin of the carapace. The fourteen thoracic somites, and especially the posterior four, are referred to by Roman numerals, a tradition that has been in use for more than 60 years.

Source : MNHN, Paris

For the list of species given for each genus, every attempt has been made to survey all relevant taxonomic literature. Nevertheless, there may well be species missing from the list, and synonyms amongst the cited names, especially in the larger genera that have not recently been revised.

In the geographical distribution for species, some new records have been included, most representing significant range extensions, from either the National Museum of Natural History or other collections; these are not indicated separately as new records. Geographic records are generally given from west to east, starting with the Eastern Pacific Ocean.

Illustrations for each genus include a lateral view of the whole animal of a representative species (wherever possible of the type species), as well as the female thelycum and the male petasma. In a few cases, additional illustrations of important diagnostic features are included. The figures illustrating the seminal receptacles, most of which include the openings for the entrance and exit of the sperm, were drawn from specimens that had been cleared and stained in hot lactic acid and chlorozol black (see MONOD and CALS, 1970, for this technique).

In addition to giving full references in the Literature Cited section for all citations in the synonymies, wherever a taxon with author and date is given, a full reference has been provided, as is fitting in a work intended to be used as a taxonomic resource.

Abbreviations

cl - carapace length. tl - total length.

Abbreviations used in the branchial formula tables: **r** - reduced; **s** - small; **v** - vestigial; **lam** - branchial lamella.

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Source : MNHN, Paris

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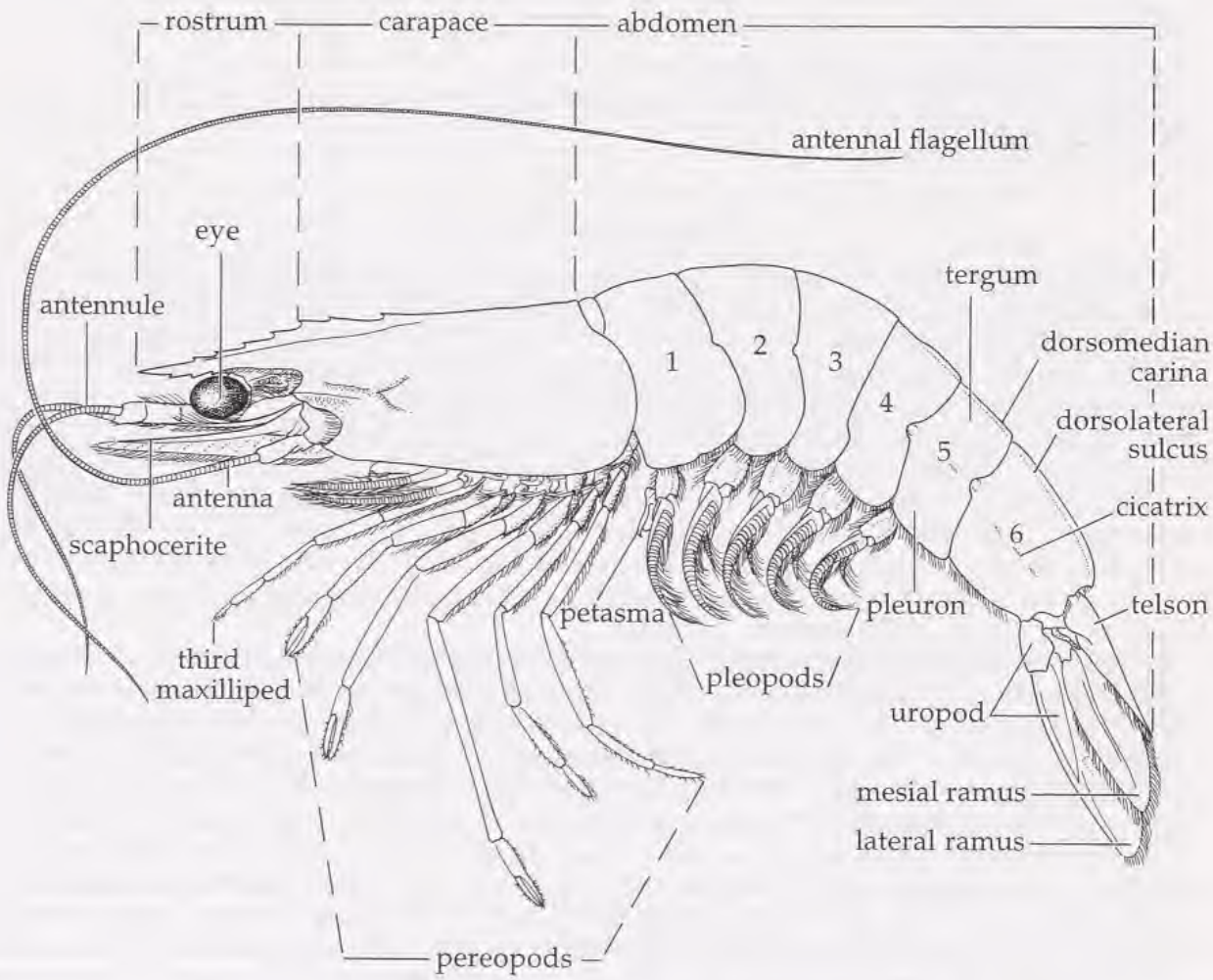


FIG. 1. — Schematic drawing of a penaeidean shrimp in lateral view.

Source : MNHN, Paris

GLOSSARY

Plural form in parentheses.

ABDOMEN. That part of the body posterior to the cephalothorax, consisting of six body segments or somites plus the telson; the "tail" (Fig. 1)

ACCESSORY LOBE. Small lobe at base of median lobe, on anterior surface of petasma in *Gennadas*.

ADROSTRAL CARINA. Ridge flanking the rostrum, sometimes nearly reaching the posterior margin of the carapace (Fig. 2B).

ADROSTRAL SULCUS. Groove flanking the rostrum mesial to the adrostral carina, sometimes nearly reaching the posterior margin of the carapace (Fig. 2B).

ANTENNA (ANTENNAE). More lateral of the two paired, usually flagellate appendages projecting distally from the anterior end of the cephalothorax (Fig. 1).

ANTENNAL CARINA. Ridge extending posteriorly along dorsal extremity of antennal region, often continuous with antennal spine (Fig. 2B).

ANTENNAL FLAGELLUM (ANTENNAL FLAGELLA). Multiarticulate, whiplike terminal part of the antenna (Fig. 1).

ANTENNAL PEDUNCLE. Five basal segments of the antenna, from which the flagellum arises distally.

ANTENNAL REGION. Area on the lateral face of the carapace posterior to and encompassing the antennal spine.

ANTENNAL SPINE. Spine situated on the anterior margin of the carapace just ventral to the orbital margin (Fig. 2A).

ANTENNULAR FLAGELLUM (ANTENNULAR FLAGELLA). Multiarticulate paired filaments (sometimes flattened and lamellate) of the antennule (Fig. 3B).

ANTENNULAR PEDUNCLE. Three basal segments of the antennule, from which the flagella arise distally (Fig. 3B).

ANTENNULE. More mesial of the two paired, usually flagellate appendages projecting from the anterior end of the cephalothorax (Fig. 1, 3B).

ANTERIOR PROCESS. Anterior part of an elongate median protuberance lying on the penultimate (XIII) thoracic sternite (Fig. 4A).

ANTEROLATERAL CARINA. Longitudinal ridge extending along anterior part of carapace, ventral to gastro-orbital carina.

APPENDIX INTERNA (APPENDICES INTERNAE). Slender lappet, sometimes rodlike, at the mesial base of the endopod of the second pleopod (dorsal to the appendix masculina) of many males.

APPENDIX MASCULINA (APPENDICES MASCULINAE). Lappet, sometimes scalelike, at the mesial base of the endopod of the second pleopod (ventral to the appendix interna if latter present) in some males.

ARTHROBRANCHIA (ARTHROBRANCHIAE). Branchia (gill) attached to the joint area between the body and the first podomere of the leg (Fig. 3C).

Source : MNHN, Paris

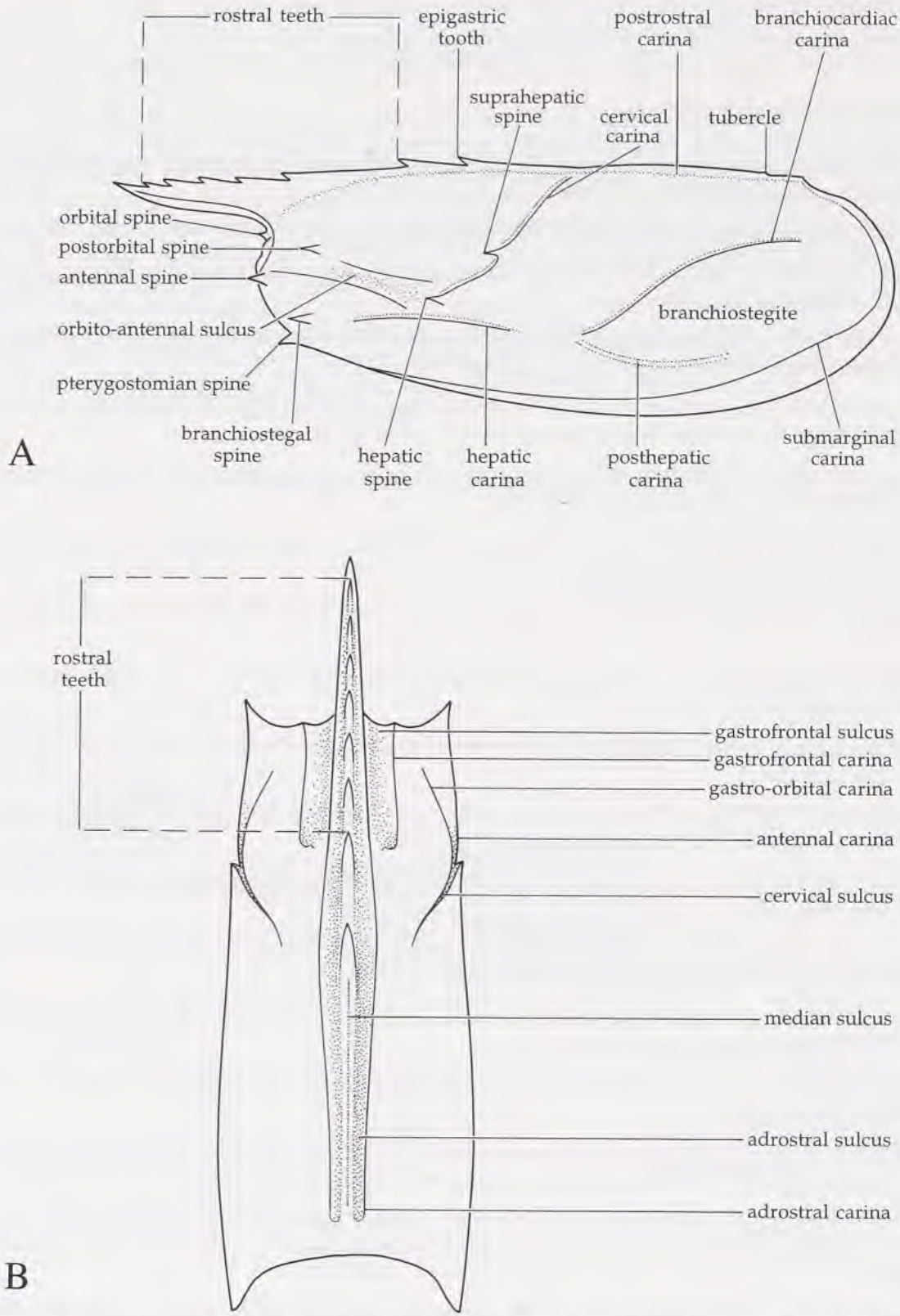


FIG. 2. — Lateral (A) and dorsal (B) views of carapace showing features used in Penaeoid shrimps taxonomy.

Source : MNHN, Paris

ARTICLE. Any one of the subdivisions of an appendage segment.

ARTICULAR MEMBRANE. Uncalcified integument at a joint, permitting movement of the exoskeleton, as between the segments of a pereopod.

BASIAL SPINE. Spine projecting from basis of a thoracic appendage.

BASIS (BASES). Second podomere or segment, from the proximal end of a typically 7-segmented appendage (Fig. 3C).

BRANCHIA (BRANCHIAE). Respiratory organ (gill) associated with an appendage or with the body wall.

BRANCHIAL REGION. Area of the carapace overlying the branchial cavity.

BRANCHIOCARDIAC CARINA. Ridge extending along posterodorsal limit of branchiostegite (Fig. 2A).

BRANCHIOCARDIAC SULCUS. Groove extending along dorsal limit of branchiostegite, running parallel to branchiocardiac carina.

BRANCHIOSTEGAL CARINA. Longitudinal ridge extending along anteroventral part of carapace, usually continuous with branchiostegal spine.

BRANCHIOSTEGAL-HEPATIC CARINA. Longitudinal ridge consisting of the fusion of the branchiostegal and hepatic carinae.

BRANCHIOSTEGAL SPINE. Short spine on or near the anterior margin of the carapace ventral to the antennal spine and dorsal to the anteroventral angle of the carapace (Fig. 2A).

BRANCHIOSTEGAL SULCUS. Groove often accompanying branchiostegal carina, located on the anteroventral part of the carapace.

BRANCHIOSTEGITE. Expanded ventro-lateral part of the carapace covering the gills (Fig. 2A).

CALATHUS. See Optic Calathus below.

CARAPACE. "Head shield" cuticular structure arising from posterior margin of cephalon, extending anteriorly and posteriorly, and covering the cephalothoracic somites of the body (Fig. 1).

CARINA (CARINAE). A ridge or keel of the exoskeleton (Fig. 1, 2).

CARPUS (CARPI). Fifth podomere from the proximal end of a typically 7-segmented appendage (Fig. 3C).

CEPHALOTHORAX. Anterior part of the body consisting of the fused cephalon (head) and thorax, bearing all the appendages except the pleopods and uropods.

CERVICAL CARINA. Mesially transverse and laterally oblique ridge extending from the anterior limit of the hepatic region towards middorsal line of carapace (Fig. 2A).

CERVICAL SULCUS. Mesially transverse and laterally oblique groove of the carapace extending from the anterior limit of the hepatic region towards the midline of the carapace (Fig. 2B).

CHELA (CHELAE). Pincer formed by the two distal podomeres of a pereopod in which the movable finger (dactyl) opposes a fixed finger formed by a distal extension of the propod (Fig. 3C).

CHELATE. Appendage ending in chela (claw).

CICATRIX (CICATRICES). Longitudinally disposed ridge(s) often present on lateral part of sixth abdominal somite (Fig. 1).

Source : MNHN, Paris

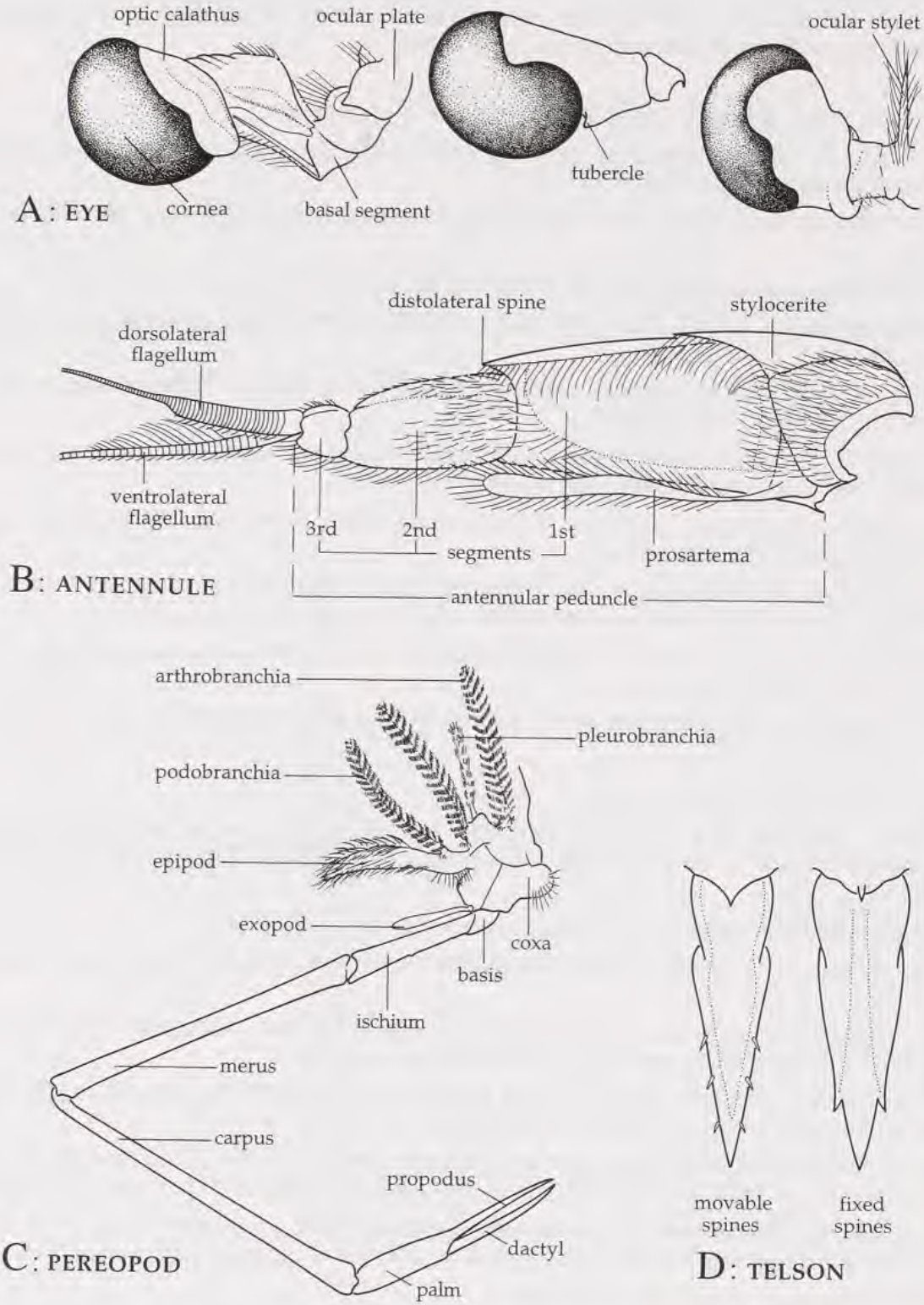


FIG. 3. — Features of the eye (A), antennule (B), pereopod (C) and telson (D) used in penaeoid shrimp taxonomy.

Source : MNHN, Paris

CINCINNULI (plural of CINCINNULUS). Minute interlocking processes projecting from the dorsomesial margins of the petasmal endopods (Fig. 4B).

CORNEA. Faceted, usually pigmented portion of the eye (Fig. 3A).

COXA (COXAE). First or proximal podomere of a typically 7-segmented appendage (Fig. 3C).

COXAL SPINE. Spine projecting from the coxa of a thoracic appendage.

DACTYL. Terminal podomere of a typically 7-segmented appendage (Fig. 3C).

DENDROBRANCHIATE GILL. One in which the paired primary branches are subdivided, sometimes highly so.

DISTAL FOLD. Distal pleat in the dorsolateral lobule of the petasma.

DISTOLATERAL PROJECTION. Distolateral, ventrally inclined projection or spur of the basis of the endopod of the male second pleopod.

DISTOMEDIAN PROJECTION. Distal, relatively narrow extension of the dorsomedian lobule of the petasma.

DISTOVENTRAL PROJECTION. Outer distal flap articulating with distal extremity of ventrolateral lobule of petasma in members of the genus *Metapenaeopsis*.

DORSOLATERAL CARINA. Longitudinal ridge on dorsolateral region of carapace running dorsal to orbital region.

DORSOLATERAL LOBULE. Dorsal part of the lateral lobe of the petasma (Fig. 4B).

DORSOLATERAL SULCUS. Longitudinal groove sometimes present close to the dorsomedian line of the sixth abdominal somite.

DORSOMEDIAN CARINA. Ridge extending along the middorsal line of the abdominal somites (Fig. 1).

DORSOMEDIAN LOBULE. Mesial part of the median lobe of the petasma (Fig. 4B).

ENDOPOD. Mesial ramus of a biramous appendage, especially one arising from the basis or from the protopodite of the pleopod.

ENDITE. Lobe of several proximal podomeres of various appendages.

EPIGASTRIC TOOTH. Tooth on the carapace situated above the gastric region behind the first (posteriormost) rostral tooth (Fig. 2A).

EPIPOD. Lateral exite of the coxa of a thoracic appendage, sometimes branchial in function (Fig. 3C).

EPISTOME. Transverse plate anterior to mouth area.

EXOPOD. Lateral ramus of a biramous appendage, arising from the basis, or from the protopodite (Fig. 3C).

EYESTALK. Peduncle or unfaceted part of the eye supporting the cornea.

FLAGELLUM (FLAGELLA). Multiarticulate, usually whiplike terminal part of the antennule or antenna (Fig. 3B).

FRONTAL REGION. Anterior area of the carapace lying between the orbits and bounded posteriorly by the gastric region.

Source : MNHN, Paris

GASTRIC REGION. Principal median area of the carapace bounded anteriorly by the frontal and orbital regions, and posteriorly by the cardiac region, and laterally by the branchial and hepatic regions.

GASTROFRONTAL CARINA. Short longitudinal ridge extending posteriorly from the ventral extremity of the orbital region (Fig. 2B).

GASTROFRONTAL SULCUS. Short longitudinal depression accompanying the gastrofrontal carina dorsally (Fig. 2B).

GASTROHEPATIC GLAND. Digestive gland associated with the midgut, within the cephalothorax.

GASTRO-ORBITAL CARINA. Short longitudinal ridge extending (often curving) anterodorsally from the cervical sulcus towards the orbital region (Fig. 2B).

GENITALIA. The external reproductive structures.

HEPATIC CARINA. Longitudinally or obliquely disposed ridge of variable length lying ventral to the hepatic region, sometimes extending almost to the anterior margin of the carapace.

HEPATIC REGION. Paired anterolateral areas of the carapace bounded anteriorly by the antennal region, posteriorly by the branchial region, and mesially by the gastric region.

HEPATIC SPINE. Lateral spine situated near the anterior margin of the hepatic region of the carapace (Fig. 2A).

HEPATIC SULCUS. Groove ventral to the hepatic region extending posteriorly, sometimes from near the anterior margin of the carapace.

INCISOR PROCESS. Cutting process, often toothed or cusped, of the mandible.

INSEMINATION. The act of placing or introducing sperm onto or into the thelycum or seminal receptacles of the female.

INTEGUMENT. Outer covering or exoskeleton.

ISCHIAL SPINE. Spine projecting from ischium or third segment of thoracic appendage.

ISCHIUM (ISCHIA). Third podomere from the proximal end of a typically 7-segmented appendage (Fig. 3C).

LABRUM. Upper lip or unpaired structure arising anterior to the mouth and often covering it.

LATERAL LOBE. One of the paired lateral parts, often folded, of the petasma (Fig. 4B).

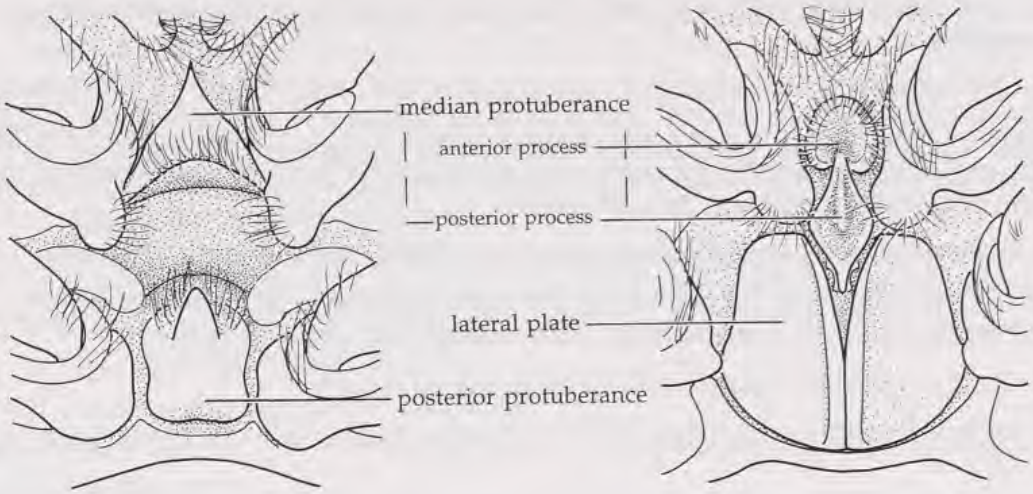
LATERAL PLATE. One of the paired, adjacent flaps sometimes present on sternite XIV in females (Fig. 4A).

LATERAL RAMUS (of uropod). Outer branch (not necessarily equivalent to the exopod) (Fig. 1).

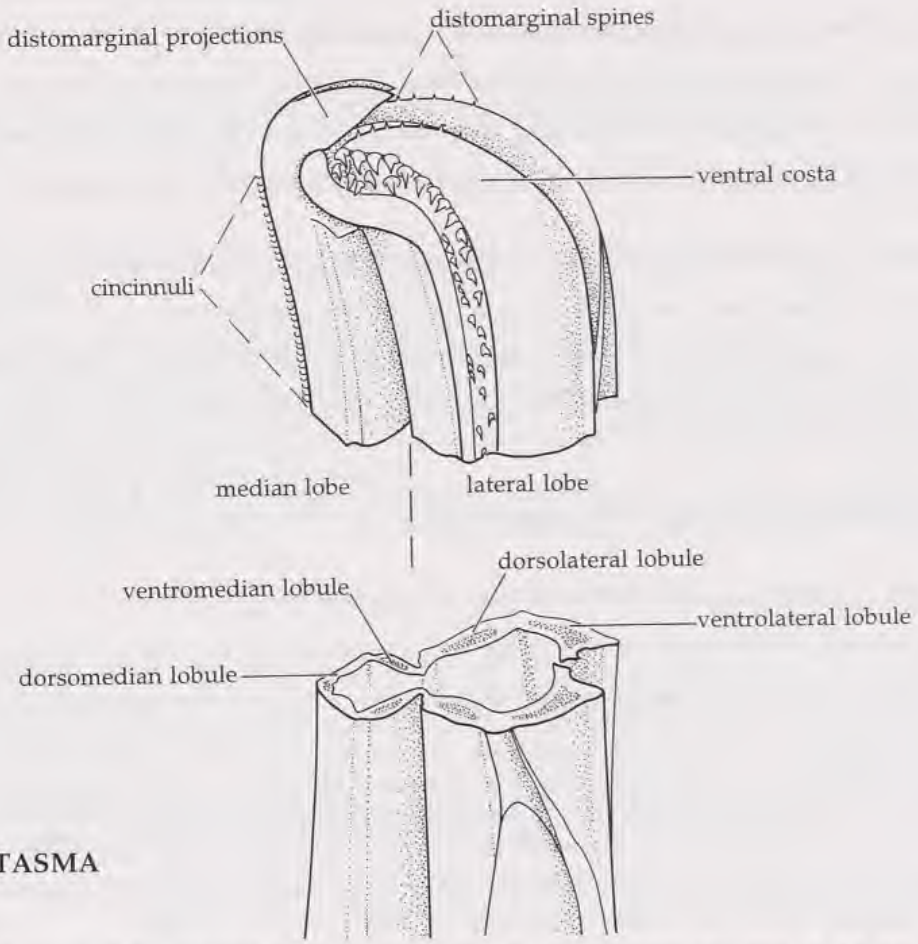
LONGITUDINAL SUTURE. Fine longitudinal line extending posteriorly just above the base of the antennal spine.

MANDIBLE. One of the heavily calcified jaws lying anterior to (beneath, in ventral view) to other mouth parts.

Source : MNHN, Paris



A : THELYCUM



B : PETASMA

FIG. 4. — Some features of the external genitalia, thelycum (A) and petasma (B), used in the penaeoid shrimps taxonomy.

Source : MNHN, Paris

MANDIBULAR PALP. One- to three-segmented endopod attached laterally to the masticatory part of the mandible.

MAXILLA (MAXILLAE). Paired mouthpart appendages of the fourth and fifth cephalic somites.

MAXILLIPED. One of a pair of three sets of thoracic appendages, arising posterior to the primary mouthparts. The two anterior pairs are often modified for feeding, while the third pair (Fig. 1) is often pediform, resembling the pereopods.

MEDIAN LOBE. One of the paired dorsal parts, often folded, of the petasma (Fig. 4B).

MEDIAN PROTUBERANCE. Conspicuous elevation, sometimes platelike, arising from the posteromedian part of the penultimate (XIII) thoracic sternite (Fig. 4A).

MEDIAN SULCUS. Dorsomedian groove on the carapace (Fig. 2B).

MERUS (MERI). Fourth segment from the proximal end of a typically 7-segmented appendage (Fig. 3C).

MESIAL RAMUS (of uropod). Inner branch (not necessarily equivalent to the endopod) (Fig. 1).

MESIAL TUBERCLE. Strong conical to low, rounded protuberance on mesial surface of optic calathus.

OCULAR PLATE. Median cephalic plate bearing the eyestalks laterally (Fig. 3A).

OCULAR SCALE. Scale-like structure located on basal segment of eyestalk (Fig. 3A).

OCULAR STYLET. Spiniform process arising from ocular plate in the genus *Sicyonia* (Fig. 3A).

OPTIC CALATHUS. Terminal article of the eyestalk supporting, often embracing the cornea of the eye (Fig. 3A).

ORBITAL MARGIN. Anterior border of the carapace, often contiguous to the eye.

ORBITAL REGION. Paired areas on the carapace just posterior to the eyes.

ORBITAL SPINE. Spine projecting from the ventral extremity of the orbital margin (Fig. 2A).

ORBITO-ANTENNAL SULCUS. Longitudinal or oblique depression between the orbital margin and the hepatic spine (Fig. 2A).

ORGANS OF PESTA. Luminescent modified areas of the gastrohepatic glands, found within the cephalothorax of some species of *Sergestes* s.l.

PALM. Portion of the chela proximal to the propodal finger (Fig. 3C).

PARAPENAEID SPINE. Spine projecting from the distomesial margin of the first antennular segment.

PEREOPOD. One of the five posterior paired appendages or legs of the cephalothorax (Fig. 1, 3C).

PETASMA (PETASMATA). The male genital structure consisting of the much enlarged and coupled endopods of the first pair of pleopods. The presence or absence of a petasma, or in juveniles, the position of the first endopods (situated more distally in females than in males), is the easiest means of distinguishing between the sexes in penaeidean shrimps (Fig. 1, 4B).

OPEN PETASMA. The lateral lobes are quite flexible, partially or entirely extended laterally, with the ventral costae not or barely turned ventrally.

Source : MNHN, Paris

SEMI-OPEN PETASMA. The lateral lobes are flexible but folded, with the ventral costae distinctly turned ventromesially, delimiting relatively ample space extending from proximal to distal ends.

SEMI-CLOSED PETASMA. The lateral lobes are rather flexible, markedly folded, supported by strong ribs, with the ventral costae approaching rather closely, delimiting moderately large space, narrowly open distally where usually overlapped by well developed distomedian projections.

CLOSED PETASMA. The lateral lobes are heavily sclerotized, sometimes making structure virtually rigid, with the ventral costae situated ventromesially, almost abutting, and delimiting a small, sometimes extremely so, space; lateral lobe usually produced distally into lateral spouts or horns.

PHOTOPHORE. Luminescent organ of the integument.

PHYLLOBRANCHIATE GILL. A gill in which the branches are platelike, usually occurring in paired series along the gill axis.

PLEOPOD. One of the biramous paired appendages typically arising ventrally from each of the anterior five abdominal somites. In the shrimps, they are primarily swimming organs (Fig. 1).

PLEUROBRANCHIA (PLEUROBRANCHIAE). Gill attached to the body wall (pleural membrane), dorsal to the articulation of the appendage (Fig. 3C).

PLEURON (PLEURA). One of the lateral flaps on each of the anterior five abdominal somites (Fig. 1).

PODOBRANCHIA (PODOBRANCHIAE). Gill borne on the basal segment (coxa) of a thoracic appendage (Fig. 3C).

PODOMERE. Any one of the segments of an appendage, such as a segment of a pereopod or maxilliped.

POSTANTENNAL SPINE. Spine located on anterolateral area of carapace on the posterior part of the antennal region.

POSTCERVICAL SPINE. Spine located immediately posterior to cervical carina.

POSTCERVICAL SULCUS. Subvertical carapace groove located posterior to cervical sulcus.

POSTERIOR PROCESS. Posterior part of an elongate median protuberance projecting caudally onto the last (XIV) thoracic sternite (Fig. 4A).

POSTERIOR PROTUBERANCE. Conspicuous elevation arising from the posteromedian part of the last (XIV) thoracic sternite (Fig. 4A).

POSTHEPATIC CARINA. Ridge posterior to hepatic carina, extending onto lower branchiostegite (Fig. 2A).

POSTOCULAR SULCUS. A small groove situated near the dorsal extremity of the orbital margin.

POSTORBITAL SPINE. Spine situated near the orbital margin posterior to the antennal spine (Fig. 2A).

POSTROSTRAL CARINA. Dorsomedian ridge extending posteriorly from the base of the rostrum, sometimes nearly reaching the posterior margin of the carapace (Fig. 2A).

PROCESSUS UNCIFER. Mesial, well separated lobule, usually having a terminal hook, in the petasma of sergestids.

Source : MNHN, Paris

PROCESSUS VENTRALIS. Ventromesial lobule located on distal half of pars media of the petasma of sergestids.

PROPODUS (PROPODI). Sixth or penultimate segment of a typically 7-segmented appendage (Fig. 3C).

PROSARTEMA. Variable in shape, thin, sometimes scalelike process arising from the mesial base of the first antennular segment, and extending distally (Fig. 3B).

PROTOCEPHALON. Anteriormost part of the body bearing eyes.

PTERYGOSTOMIAN CARINA. Ridge running posterior to pterygostomian spine on antero-ventral part of carapace.

PTERYGOSTOMIAN REGION. Anteroventral area of the carapace.

PTERYGOSTOMIAN SPINE. Marginal spine arising from the anteroventral angle or border of the carapace.

RAMUS (RAMI). A branch of an appendage, e.g. the exopod or endopod.

ROSTRUM (ROSTRA). Anteromedian projection of the carapace between the eyes (Fig. 1).

SCAPHOCERITE. Laterally rigid lamellate exopod of the antenna; the antennal scale (Fig. 1).

SEGMENT. Division of an appendage.

SEMINAL RECEPTACLES. Unpaired or paired bulbous or tubular sacs associated with the thelycum for the storage of spermatophores or sperm, situated immediately dorsal to plate(s) of sternite XIV, sometimes XIII and/or XII.

UNPAIRED RECEPTACLES. Non-invaginated, opening either through an exposed median longitudinal slit flanked by lateral plates of sternite XIV, or opening anterior to single plate.

PAIRED RECEPTACLES. Invaginated into the cephalothoracic cavity, opening through well protected slits usually on anterior border of sternite XIV, or on anterior part of XIII.

SOMITE. Each of the main divisions of the body.

SPERMATOPHORE. The sperm-carrying, variously complex mass, issuing from the male gonopore during copulation.

STATOCYST. Sensory organ of awareness of rotation and position located at base of first antenna.

STERNITE. Ventral part of a thoracic or abdominal somite.

STERNUM. Ventral surface of the cephalothorax or abdomen.

STYLOCERITE. Pointed scale arising from the lateral base of the first segment of the antennular peduncle (Fig. 3B).

SUBHEPATIC SULCUS. Groove located well ventral to the hepatic region of the carapace and the hepatic spine.

SUBLATERAL SULCUS. Groove located ventral to lateral carina of carapace.

SUBMARGINAL CARINA. An almost longitudinal ridge extending between rigid, and membranous part of the branchiostegite (Fig. 2A).

Source : MNHN, Paris

SUBROSTRAL SULCUS. A longitudinal elongate groove extending along dorsal limit of the orbital region.

SULCUS (SULCI). Groove.

SUPRAHEPATIC SPINE. Spine arising from the edge of the cervical carina dorsal to the hepatic spine (Fig. 2A).

SUPRAORBITAL SPINE. Spine located posterior to the orbital margin of the carapace.

SUTURE. Either transverse or longitudinal, weakly sclerotized line or seam on the carapace.

TELSON. Terminal unit of the abdomen bearing the anus (Fig. 1, 3D).

TERGUM (TERGA). Arched dorsal part of each of the anterior five abdominal somites (Fig. 1).

THELYCUM (THELYCA). The female genitalia consisting of modifications of the posterior two, or sometimes three thoracic sternites (XII-XIV) serving for the storage or transfer of the sperm, usually in spermatophores, and often shielding seminal receptacles (Fig. 4A).

OPEN THELYCUM. One in which the seminal receptacles are absent.

CLOSED THELYCUM. One in which the seminal receptacles are present.

THORACIC RIDGE. Highly sclerotized rib-like transverse structure across posterior margin of sternite XIV.

TRANSVERSE SUTURE. Fine short vertical line extending dorsally from the ventral margin of the carapace.

TRICHOBRANCHIATE GILL. A gill in which the branches are fingerlike and project from a central axis.

UROPOD. Paired biramous appendage attached to the sixth abdominal somite, usually combining with the telson to form a tailfan.

VENTRAL COSTA. Ridge extending along the ventromesial margin of the ventrolateral lobule of the petasma (Fig. 4B).

VENTROLATERAL LOBULE. Ventral part of the lateral lobe of the petasma (Fig. 4B).

VENTROMEDIAN LOBULE. Lateral part of the median lobe of the petasma (Fig. 4B).

Source : MNHN, Paris

Source : MNHN, Paris

SYSTEMATIC SECTION

Superclass CRUSTACEA Pennant, 1777

Class MALACOSTRACA Latreille, 1806

Order DECAPODA Latreille, 1803

Suborder DENDROBRANCHIATA Bate, 1888

Dendrobranchiata Bate, 1888, Rep. scient. Results Voy. Challenger, 24: 217. — BURKENROAD, 1963a, Tulane Stud. Geol., 2(1): 2. — GLAESSNER, 1969, Treat. Invert. Paleont., R, Arthropoda 4(2): R446. — BURKENROAD, 1981, Trans. San Diego Nat. Hist. Soc., 19(17): 251. — BOWMAN and ABELE, 1983, Biol. Crust., 1: 21. — BURKENROAD, 1983, Crust. Issues, 1: 279. — FELGENHAUER and ABELE, 1983, Crust. Issues, 1: 304. — DALL *et al.*, 1990, Adv. Mar. Biol., 27: 57.

DIAGNOSIS. — Protocephalon consisting of ocular plate and epistomial region. Epistome divided by membranous invagination. Lateral epistomial bars present anterior to labrum. Gastric mill well developed, with strong median tooth and well developed lateral teeth. Third maxilliped pediform, of 7 segments. First three pairs of pereopods usually chelate (except in some Sergestoidea), third pair never unusually robust. Pleura of second abdominal somite not overlapping those of first. Abdominal somites locked to each other by midlateral hinges, usually exposed on anterior margin of second, third, fifth, and sixth somites, those of fourth very low and hidden. Gills dendrobranchiate. First pair of pleopods in males with endopods considerably modified, forming petasma; in females, much reduced or lacking. Eggs released directly into water, not carried by females, (except in *Lucifer*, where eggs retained for short period on third pereopods), hatching as nauplii or protozoeae.

Key to the Superfamilies of the Dendrobranchiata

1. Some thoracic somites with at least 3 branchiae on each side. At least 11 branchiae present on each side ..... PENAEOIDEA
— Never more than 2 branchiae per thoracic somite. Never more than 7 or 8 branchiae per side ..... SERGESTOIDEA

Superfamily PENAEOIDEA Rafinesque-Schmaltz, 1815

Penaeoidea Rafinesque-Schmaltz, 1815, Anal. Nat. Tabl. Univers, : 98. — GLAESSNER, 1969, Treat. Invert. Paleont., R, Arthropoda, 4(2): R447. — BURKENROAD, 1983, Crust. Issues, 1: 280, 281, 285.

DIAGNOSIS. — All five pairs of pereopods well developed. Pleurobranchia present at least on somite IX (that of third maxilliped). Some somites with at least three branchiae on each side. Total number of well developed gills on each side at least 11.

Source : MNHN, Paris

Includes five families: Aristeidae Wood-Mason, 1891; Benthesicymidae Wood-Mason, 1891; Penaeidae Rafinesque-Schmaltz, 1815; Sicyoniidae Ortmann, 1898; Solenoceridae Wood-Mason, 1891.

Key to the Families of the Superfamily PENAEOIDEA

1. Postorbital spine present ..... SOLENOCERIDAE
— Postorbital spine absent **2**

2. Integument rigid and stony; third to fifth pleopods uniramous, lacking endopods ..... SICYONIIDAE
— Integument never stony; third to fifth pleopods biramous **3**

3. 1 or 2 (occasionally 3) rostral/postrostral teeth ..... BENTHESICYMIDAE
— More than 2 rostral/postrostral teeth **4**

4. Prosartema well developed ..... PENAEIDAE
— Prosartema reduced to setose boss ..... ARISTEIDAE

Family ARISTEIDAE Wood-Mason, 1891

Aristaeina Wood-Mason, 1891, Ann. Mag. nat. Hist., (6)8: 278.

Aristaeinae - ALCOCK, 1901, Descr. Cat. Indian Deep-Sea Crust., : 27. — RAMADAN, 1938, Scient. Rep. John Murray Exped., 5(3): 36. — KUBO, 1949, J. Tokyo Coll. Fish., 36(1): 193.

Aristeinae - BOUVIER, 1908a, Résult. Camp. scient. Prince Albert I, 33: 6, 13. — BALSS, 1957, Bronn's Kl. Ordn. Tierreichs, 5(1)7(12): 1516. — CROSNIER, 1978, Faune Madagascar, 46: 14. — BURKENROAD, 1983, Crust. Issues, 1: 281, 286.
Placed on the Official List of Family-Group Names in Zoology, International Commission on Zoological Nomenclature, 1969, Opinion 864, Bull. zool. Nom., 25(4/5): 141.

Aristeae - BOUVIER, 1908a, Résult. Camp. scient. Prince Albert I, 33: 6, 51. — BALSS, 1957, Bronn's Kl. Ordn. Tierreichs, 5(1)7(12): 1517.

Penaeidae - BARNARD, 1950, Ann. S. Afr. Mus., 38: 580 [part].

Aristeidae - CROSNIER, 1978, Faune Madagascar, 46: 14. — PÉREZ FARFANTE, 1978, FAO Sp. Ident. Sh., 6: 2. — BURKENROAD, 1983, Crust. Issues, 1: 281. — DE FREITAS, 1985, Investl. Rep. oceanogr. Res. Inst., Durban, 57: 3. — PÉREZ FARFANTE, 1988, NOAA Tech. Rep. NMFS, 64: iii, 6. — SQUIRES, 1990, Can. Bull. Fish. Aq. Sci., 221: 20.

Aristaeidae - GREY *et al.*, 1983, Guide Austr. Prawns, : 13, 14. — DALL *et al.*, 1990, Adv. Mar. Biol., 27: 58.

DIAGNOSIS. — Rostrum usually elongate in females, sexually dimorphic in several genera, being elongate in females and juvenile males, short in adult males; usually with only 3 dorsal rostral/postrostral teeth (more only in *Aristaeomorpha*); lacking ventral teeth. Carapace lacking postorbital and pterygostomian spines; antennal and branchiostegal spines always present; postantennal spine rarely present and hepatic spines often lacking; cervical and postcervical sulci sometimes present, most often reaching dorsal midline, or almost absent and visible only laterally. Third abdominal somite sometimes carinate, fourth to sixth somites always carinate. Telson apically acute, bearing 3 or 4 pairs of movable lateral spines.

Eye with optic calathus bearing mesial tubercle; ocular scale and styliform projection lacking. Antennule with prosartema reduced to setose boss; flagella unequal, dorsal flagellum short, flattened for most of its length, inserted proximally on third segment; ventral flagellum sexually dimorphic in some genera. Palp of first maxilla consisting of single curved article. Exopods

Source : MNHN, Paris

present on all maxillipeds, present or absent on pereopods. Third through fifth pleopods biramous. Pleurobranchia on somites IX to XIV; one arthrobranchia on somite VII, two on somites VIII through XIII; podobranchia on second maxilliped through second or third pereopods; epipod present on maxillipeds and first to third or fourth pereopods.

Petasma open; ventral costa usually projecting free for variable fraction of its length, often extending as far as distal margin of dorsolateral lobule. Second pleopod of male bearing appendix masculina and appendix interna, lacking distolateral projection. Thelycum open; sternite XIV with deep concavity, sternite XIII with variously shaped shieldlike median protuberance.

Key to the Genera of the Family ARISTEIDAE

1. Three rostral/postrostral teeth present **2**
— More than 3 rostral/postrostral teeth present ..... ***Aristaeomorpha***

2. Postantennal spine absent **3**
— Postantennal spine present ..... ***Parahepomadus***

3. Hepatic spine absent **4**
— Hepatic spine present ..... ***Hepomadus***

4. Exopods absent from first to fifth pereopods **5**
— Exopods present on first to fifth pereopods **7**

5. Distal movable meral spine present on first and second pereopods; Scaphocerite in male not modified **6**
— Meral spine lacking on first and second pereopods; Scaphocerite in male modified, distally elongate ..... ***Aristaeopsis***

6. Postcervical sulcus present ..... ***Pseudaristeus***
— Postcervical sulcus absent ..... ***Aristeus***

7. Fourth to sixth abdominal somites dorsally carinate; Epipod on fourth pereopod large **8**
— Third to sixth abdominal somites dorsally carinate; Epipod on fourth pereopod rudimentary ..... ***Hemipenaeus***

8. Carapace ridges and carinae weak; Podobranchia on third pereopod rudimentary; Ventral antennular flagellum in male modified; Dactyl of third maxilliped in male modified ..... ***Austropenaeus***
— Carapace with ridges and carinae moderately strong to strong; Podobranchia on third pereopod large; Ventral antennular flagellum in male not modified; Dactyl of third maxilliped in male not modified ..... ***Plesiopenaeus***

Genus *Aristaeomorpha* Wood-Mason, 1891

Figures 5-6

Penaeus - Risso, 1827, Hist. Nat. Prin. Prod. Europe Mérid., : 69 [part]. — H. Milne Edwards, 1837, Hist. Nat. Crust., 2: 418 [part].

Aristeus - Bate, 1881, Ann. Mag. nat. Hist., (5)8: 189; 1888, Rep. scient. Results Voy. Challenger, 24: 317 [part].

Source : MNHN, Paris

Aristaeomorpha Wood-Mason, 1891, Ann. Mag. nat. Hist., (6)8: 286. — ANDERSON and LINDNER, 1943, Trans. Am. Fish. Soc., 73: 301. — KUBO, 1949, J. Tokyo Coll. Fish., 36(1): 200. — CROSNIER, 1978, Faune Madagascar, 46: 52. — DE FREITAS, 1985, Investl. Rep. oceanogr. Res. Inst., Durban, 57: 15.
Placed on the Official List of Generic Names in Zoology, International Commission on Zoological Nomenclature, 1969, Opinion 864, Name No. 1804, Bull. zool. Nom., 25(4/5): 138.

Aristeomorpha - SENNA, 1903, Boll. Soc. ent. ital., 34: 268. — BOUVIER, 1908a, Résult. Camp. scient. Prince Albert I, 33: 52. — RAMADAN, 1938, Scient. Rep. John Murray Exped., 5(3): 53. — BURKENROAD, 1983, Crust. Issues, 1: 281.

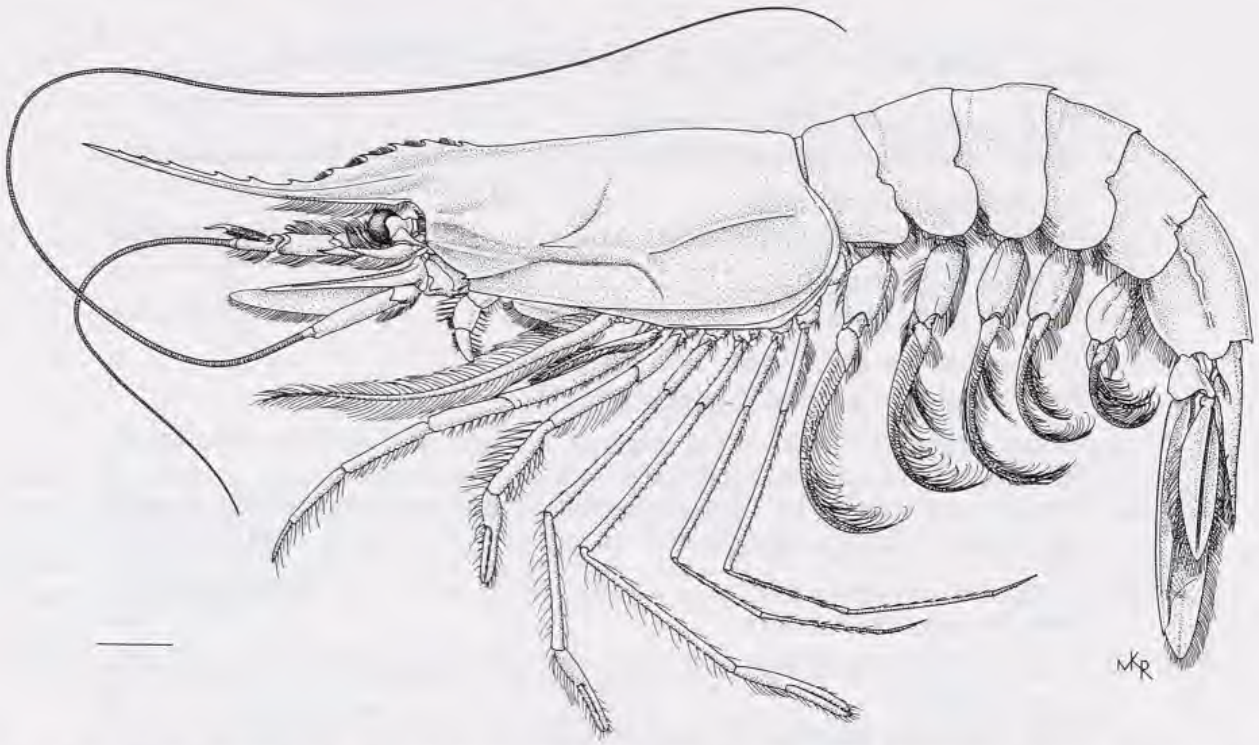


FIG. 5. — *Aristaeomorpha foliacea*, ♀ 52.5 mm cl, south of Soto la Marina, northeast Mexico. Lateral view. Scale = 10 mm.

TYPE SPECIES: By original designation, *Aristeus rostridentatus* Bate, 1881, Ann. Mag. nat. Hist., (5)8: 189 [= *Aristaeomorpha foliacea* (Risso, 1827)].

TYPE LOCALITY: Off Matuku, Fiji, 19°09'35"S, 179°41'50"E, 549 m.

GENDER: Feminine.

DIAGNOSIS. — Integument pubescent, with small scattered photophores on ventrum of cephalothorax and abdomen, and on antennal scale and on lateral ramus of uropod, and on most other appendages. Rostrum elongate in females and juvenile males, reaching well beyond scaphocerite; short in adult males, not reaching third antennular peduncle segment, bearing 3-7 dorsal teeth along its entire length, followed by 2 postrostral teeth. Carapace with antennal and branchiostegal spines on anterior margin; orbital, pterygostomian, and postantennal spines absent; hepatic spine well developed; postrostral carina reaching about two-thirds of carapace; cervical sulcus demarked ventrolaterally, becoming obsolete towards dorsal midline; postcervical sulcus faint; branchiostegal carina sharp anteriorly; hepatic carina well marked, accompanying shallow but well defined sulcus; branchiocardiac carina strong, almost reaching posterior margin

Source : MNHN, Paris

of carapace. First and second abdominal somites dorsally rounded, third to sixth somites dorsally carinate, carina of third somite extending only along posterior two-thirds, almost indistinct, four posterior somites ending in sharp spine. Telson bearing 4 pairs of movable lateral spines in posterior half.

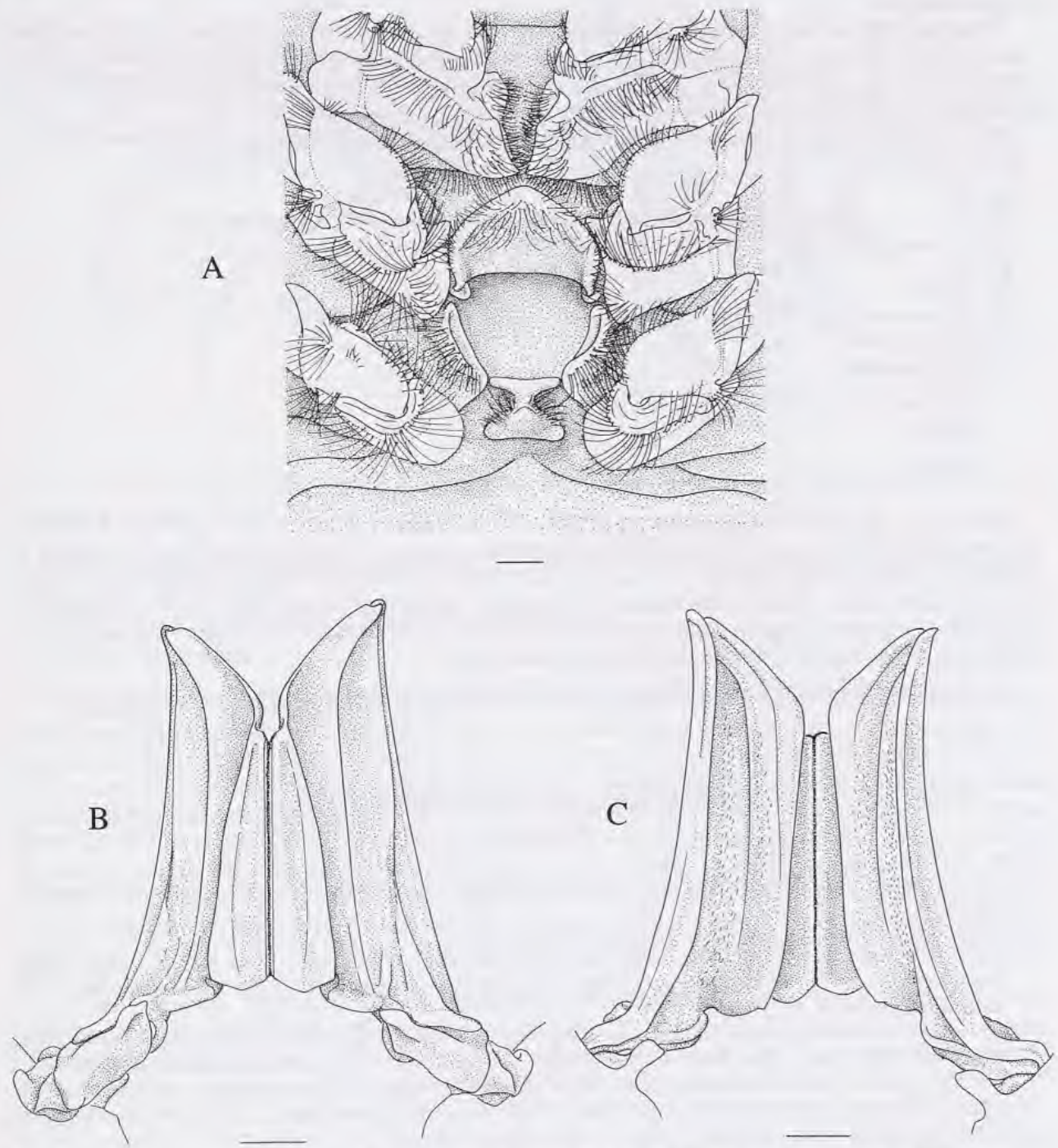


FIG. 6. — *Aristaeomorpha foliacea*: **A**, ♀ 52.5 mm cl, south of Soto la Marina, northeast Mexico. Thelycum. — **B-C**, ♂ 40.0 mm cl, *ibidem*. **B**, Petasma, dorsal view. **C**, *idem*, ventral view. Scales = 1 mm.

Source : MNHN, Paris

Eye with cornea well developed, optic calathus bearing minute mesial tubercle mesiodistally. Dorsal antennular flagellum short, flattened for most of its length; ventral flagellum elongate, slender, terete, not modified in male. Scaphocerite with lateral marginal ridge ending in short spine at about three-fourths length of lamella. Pereopods lacking exopods; ischial and meral spines absent; fourth and fifth pereopods slender. Third pereopod bearing podobranchia.

Petasma with dorsolateral lobule roughly trapezoidal, conspicuously surpassing median lobe; ventral costa as long as dorsolateral lobule, attached along almost entire length, with tip turning slightly mesially. Thelycum open, with shieldlike median protuberance on sternite XIII directed anteroventrally; sternite XIV bearing short rounded median prominence.

The formation and structure of the complex spermatophore of *A. foliacea* were described by TUNESI (1987).

Distribution of branchiae, epipods, and exopods in the genus *Aristaeomorpha*.

Somite	VII (Mxp1)	VIII (Mxp2)	IX (Mxp3)	X (P1)	XI (P2)	XII (P3)	XIII (P4)	XIV (P5)
Pleurobranchiae	-	-	s	1	1	1	1	1
Arthrobranchiae	s	s+1	2	2	2	2	2	-
Podobranchiae	-	1	1	1	1	1	-	-
Epipods	1	1	1	1	1	1	1	-
Exopods	1	1	1	-	-	-	-	-

SPECIES. — *Aristaeomorpha foliacea* (Risso, 1827). Western Atlantic Ocean, Massachusetts to Florida, Gulf of Mexico, Caribbean Sea to Venezuela; Eastern Atlantic Ocean, Bay of Biscay to Western Sahara; Azores; Madeira; Canary Islands; Mediterranean; off east coast of South Africa; Mozambique; East Africa; Madagascar; Réunion; Maldive Islands; Sri Lanka; Indonesia; Philippines; Taiwan; Japan; Western Australia, New South Wales, Victoria, Australia; New Caledonia; New Zealand; Wallis and Futuna Islands; Fiji.

Aristaeomorpha woodmasoni Calman, 1925. Arabian Sea; Bay of Bengal; Andaman Sea.

Genus ***Aristaeopsis*** Wood-Mason, 1891

Figures 7-8

Penaeus - JOHNSON, 1867, Proc. zool. Soc. Lond., 1867: 897 [part]. — BATE, 1881, Ann. Mag. nat. Hist., (5)8: 188 [part].

Aristeus - MIERS, 1878, Proc. zool. Soc. Lond., 1878: 308 [part].

Aristaeopsis Wood-Mason, 1891, Ann. Mag. nat. Hist., (6)8: 282. — BOUVIER, 1908a, Résult. Camp. scient. Prince Albert I, 33: 61. — BURKENROAD, 1936b, Bull. Bingham oceanogr. Coll., 5(2): 94. — CROSNIER, 1978, Faune Madagascar, 46: 86.

Plesiopeneus - FAXON, 1895, Mem. Mus. Comp. zool. Harv., 18: 199 [part]. — A. MILNE EDWARDS and BOUVIER, 1909, Mem. Mus. comp. Zool. Harv., 27: 200 [part]. — BURKENROAD, 1936b, Bull. Bingham oceanogr. Coll., 5(2): 94 [part]. — RAMADAN, 1938, Scient. Rep. John Murray Exped., 5(3): 49 [part]. — BARNARD, 1950, Ann. S. Afr. Mus., 38: 621 [part]. — CROSNIER, 1978, Faune Madagascar, 46: 85 [part]. — SQUIRES, 1990, Can. Bull. Fish. Aq. Sci., 221: 41.

Aristaeus (Plesiopenaeus) - ALCOCK, 1901, Descr. Cat. Indian Deep-Sea Crust., : 35 [part].

Aristaeus (Aristaeopsis) - ALCOCK, 1901, Descr. Cat. Indian Deep-Sea Crust., : 40 [part].

Aristeopsis - DE MAN, 1911, Siboga Exped., 39a: 6.

Source : MNHN, Paris

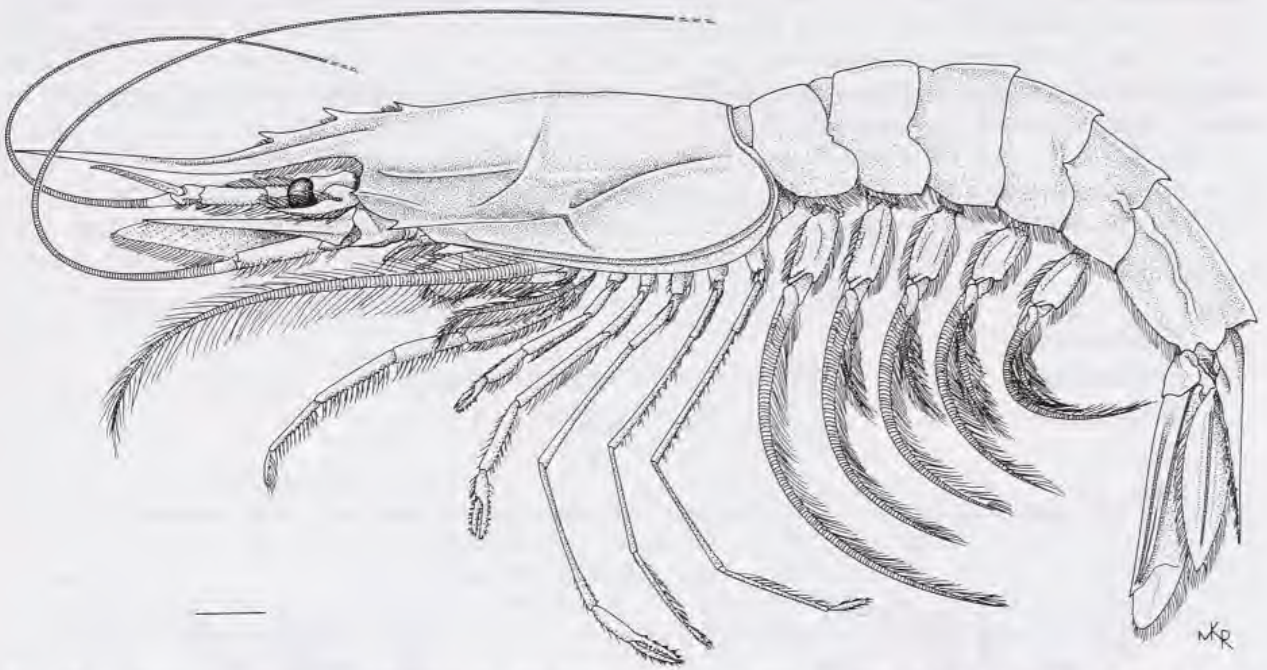


FIG. 7. — *Aristaeopsis edwardsiana*, ♀ 54 mm cl, Guadeloupe Passage, Caribbean Sea. Lateral view. Scale = 10 mm.

TYPE SPECIES: By original designation, *Penaeus edwardsianus* Johnson, 1867, Proc. zool. Soc. Lond., 1867: 897.

TYPE LOCALITY: Off Madeira, Northeast Atlantic Ocean.

GENDER: Feminine.

DIAGNOSIS. — Integument glabrous. Rostrum moderately elongate in females and juvenile males, reaching beyond apex of scaphocerite; somewhat shorter in adult males, not reaching third antennular peduncle segment, bearing 2 basal teeth followed by single postrostral tooth. Carapace with antennal and branchiostegal spines on anterior margin, each supported by strong carina; orbital, postantennal, and hepatic spines absent. Cervical sulcus ventrally deep, rather weak dorsally, almost reaching dorsal midline; postcervical sulcus absent; postrostral carina reaching posteriorly about three-fourths length of carapace; gastro-orbital, hepatic, and branchiocardiac carina strong. First abdominal somite dorsally rounded; second somite with barely discernible rounded middorsal carina in posterior half; third to sixth somites with sharp carina, ending posteriorly in short spine. Telson pointed, with 4 pairs of small lateral movable spines in posterior half.

Eye with cornea slightly flattened; calathus moderately short, with strong mesial tubercle distally. Dorsal antennular flagellum short, flattened; ventral antennular flagellum elongate, terete, not modified in adult male. Scaphocerite in adult female with blade apically acute-angled, lateral marginal ridge ending in short spine at about four-fifths length; in adult male, lamella of scaphocerite produced distally into elongate slender structure, ovate in cross-section, subequal in length to proximal broad part; in female, lateral ridge falling short of distal margin of lamella. Pereopods lacking exopods; first and second pereopods lacking movable distal meral and ischial spines. Fourth and fifth pereopods more slender, especially distally, than preceding pereopods. Third pereopod bearing podobranchia.

Source : MNHN, Paris

Petasma with dorsolateral lobule reaching as far as median lobe; ventral costa slightly overreaching distal margin of dorsolateral lobule, attached along entire length to adjacent flexible part of ventrolateral lobule; its tip becoming mesially-directed conspicuous hook. Thelycum open, with cup-like hollow formed by anteriorly acute median protuberance on sternite XIII and strongly raised, roughly rectangular, anteriorly rounded median prominence flanked anteriorly by strong rounded lateral flaps on sternite XIV.

Distribution of branchiae, epipods, and exopods in the genus *Aristaeopsis*.

Somite	VII (Mxp1)	VIII (Mxp2)	IX (Mxp3)	X (P1)	XI (P2)	XII (P3)	XIII (P4)	XIV (P5)
Pleurobranchiae	-	-	1	1	1	1	1	1
Arthrobranchiae	1	s+1	2	2	2	2	2	-
Podobranchiae	-	1	1	1	1	1	-	-
Epipods	1	1	1	1	1	1	1	-
Exopods	1	1	1	-	-	-	-	-

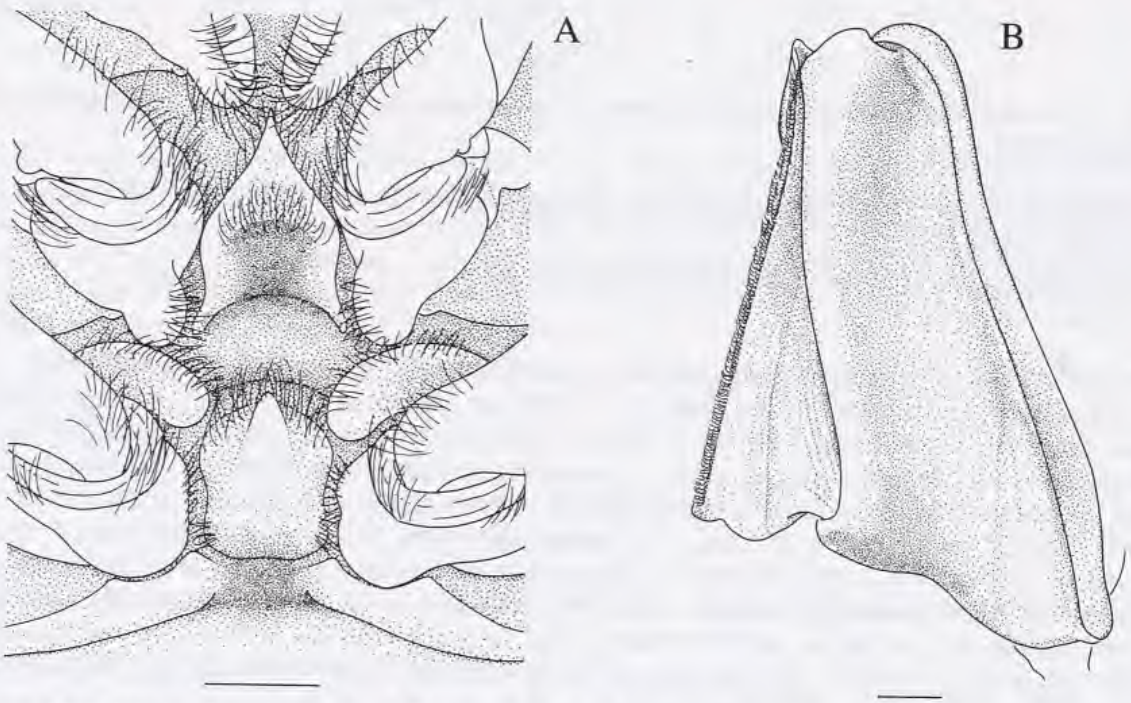


FIG. 8. — *Aristaeopsis edwardsiana*: **A**, ♀ 72 mm cl, Gulf of Mexico. Thelycum. — **B**, ♂ 54 mm cl, Guadeloupe Passage, Caribbean Sea. Petasma, dorsal view. Scales = 1 mm.

REMARKS. — The genus *Aristaeopsis* was originally created for the species *Penaeus edwardsianus,* but was later synonymised with *Plesiopenaeus* (BURKENROAD, 1936b; CROSNIER, 1978). Five features, however, separate this species from typical *Plesiopenaeus* (*P. armatus*), as well as from *Plesiopenaeus nitidus* Barnard, and thus necessitate the recognition of *Aristaeopsis* as a valid genus. These features are: the absence of exopods on the first to fifth pereopods; the presence of a blunt, rounded middorsal carina on the second abdominal somite; the presence of a

Source : MNHN, Paris

sharp middorsal carina on the third abdominal somite; the apparently unique modification of the antennal scaphocerite in the adult male; the absence of a distal meral spine on the first and second pereopods.

SPECIES. — *Aristaeopsis edwardsiana* (Johnson, 1867). Western Atlantic Ocean from Grand Banks to Gulf of Mexico, Caribbean Sea to French Guiana; Bermuda; eastern Atlantic Ocean from Azores, Madeira, Canary Islands, Portugal, Morocco, Western Sahara, to South Africa; East Coast of Africa; Madagascar; Arabian Sea; central Indian Ocean; Bay of Bengal; Andaman Sea; Indonesia; Japan; South China Sea; New South Wales, Australia; Wallis and Futuna Islands.

Genus *Aristeus* Duvernoy, 1840

Figures 9-10

Penaeus - RISSO, 1816, Hist. nat. Crust., Nice, : 96.

Aristeus Duvernoy, 1840, C. r. hebd. Séanc. Acad. Sci., Paris, 11: 217. — BATE, 1881, Ann. Mag. nat. Hist., (5)8: 171, 187; 1888, Rep. scient. Results Voy. Challenger, 24: 228, 240, 309. — SENNA, 1903, Boll. Soc. ent. ital., 34: 261. — BOUVIER, 1908a, Résult. Camp. scient. Prince Albert I, 33: 69. — DE MAN, 1911, Siboga Exped., 39a: 27. — RAMADAN, 1938, Scient. Rep. John Murray Exped., 5(3): 36. — CROSNIER, 1978, Faune Madagascar, 46: 60. — BURKENROAD, 1983, Crust. Issues, 1: 281. — DE FREITAS, 1985, Investl. Rep. oceanogr. Res. Inst., Durban, 57: 3.
Placed on the Official List of Generic Names in Zoology, International Commission on Zoological Nomenclature, 1969, Opinion 864, Name No. 805, Bull. zool. Nom., 25(4/5): 138.

Aristaeus - FAXON, 1895, Mem. Mus. comp. Zool. Harv., 18: 194, 197. — ALCOCK, 1901, Descr. Cat. Indian Deep-Sea Crust., : 27. — ANDERSON and LINDNER, 1943, Trans. Am. Fish. Soc., 73: 300. — KUBO, 1949, J. Tokyo Coll. Fish., 36(1): 194.

Aristaeus (Aristaeus) - ALCOCK, 1901, Descr. Cat. Indian Deep-Sea Crust., : 29.

TYPE SPECIES: By original designation, *Penaeus antennatus* Risso, 1816, Hist. nat. Crust., Nice: 96.

TYPE LOCALITY: Mediterranean Sea off Nice.

GENDER: Masculine.

DIAGNOSIS. — Integument glabrous or pubescent; photophores present on pereopods. Rostrum elongate in females and juvenile males, reaching well beyond antennular peduncle; short in adult males, not reaching end of antennular peduncle; bearing 2 dorsal teeth near base followed by single postrostral tooth. Carapace with antennal and branchiostegal spines on anterior margin, both supported by more or less well marked short carina; orbital, postantennal, and hepatic spines absent; postrostral carina variable, reaching as far as midlength of carapace in some species; cervical sulcus indistinct or only ventrolaterally demarked; hepatic sulcus often faint or indistinct; branchiocardiac sulcus well marked; branchiocardiac carina low. First abdominal somite dorsally rounded; second and third somites dorsally rounded or with very faint rounded carina; fourth to sixth somites dorsally carinate, carina of fourth somite extending only along posterior two-thirds. Telson bearing 4 pairs of movable lateral spines; apex acute, slender.

Eye with well developed cornea; optic calathus bearing large mesiodistal tubercle. Dorsal antennular flagellum short, flattened for most of its length; ventral antennular flagellum elongate, slender, terete, with proximal sinuosity in male. Scaphocerite lamella distally broadly rounded, lateral marginal ridge with spine at about distal four-fifths of length. Pereopods lacking exopods; first and second pereopods, sometimes third, with movable meral spine; fourth and fifth pereopods slender. Third to fifth pereopod lacking podobranchia.

Source : MNHN, Paris

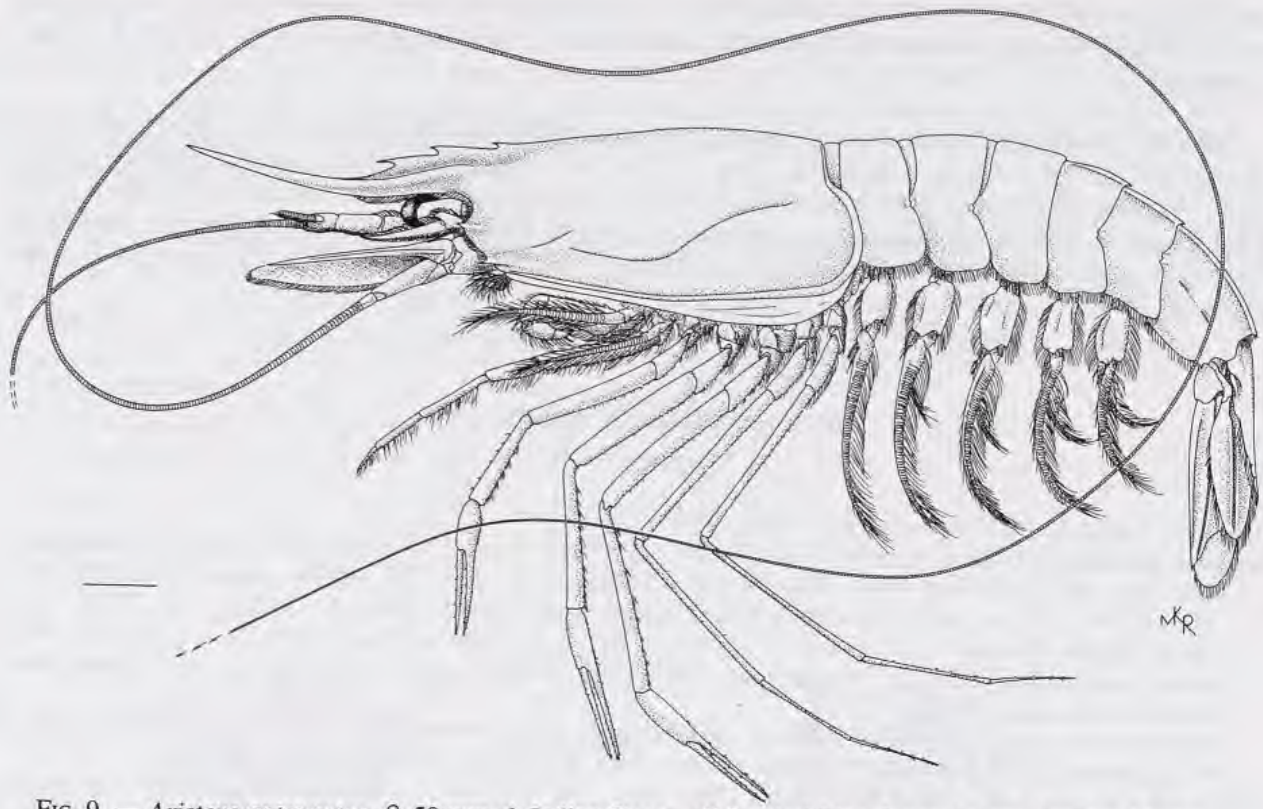


FIG. 9. — *Aristeus antennatus*, ♀ 50 mm cl, Indian Ocean off South Africa. Lateral view. Scale = 10 mm.

Petasma with broad, distally rounded dorsolateral lobule, slightly to considerably surpassing ventromedian lobule; ventral costa unattached to adjacent flexible part for variable fraction of its length, and not produced into hook. Thelycum open, with shieldlike median protuberance on sternite XIII; sternite XIV broadly rectangular, slightly hollowed.

The complex structure and formation of the spermatophore of *A. antennatus* were thoroughly described by ORSI RELINI and TUNESI (1987).

Distribution of branchiae, epipods, and exopods in the genus *Aristeus*.

Somite	VII (Mxp1)	VIII (Mxp2)	IX (Mxp3)	X (P1)	XI (P2)	XII (P3)	XIII (P4)	XIV (P5)
Pleurobranchiae	-	-	1	1	1	1	1	1
Arthrobranchiae	1	s+1	2	2	2	2	2	-
Podobranchiae	-	1	1	1	1	-	-	-
Epipods	1	1	1	1	1	1	-	-
Exopods	1	1	1	-	-	-	-	-

SPECIES. — *Aristeus alcocki* Ramadan, 1938. Gulf of Aden; Arabian Sea; India; Bay of Bengal.

Aristeus antennatus (Risso, 1816). Eastern Atlantic Ocean from Portugal to Cape Verde Islands and Azores; Mediterranean; Natal, South Africa; Mozambique; Zanzibar; Madagascar; Réunion; Maldive Islands.

Source : MNHN, Paris

Aristeus antillensis A. Milne Edwards and Bouvier, 1909. Delaware to Florida; Gulf of Mexico; Caribbean Sea to French Guiana.

Aristeus mabahissae Ramadan, 1938. Madagascar; Maldive Islands; Saya de Malha Bank; Indonesia; Japan; New Caledonia; Wallis and Futuna Islands.

Aristeus pallidicauda Komai, 1993. Japan.

Aristeus semidentatus Bate, 1881. Madagascar; Arabian Sea; India; Malaysia; Indonesia; New South Wales, Australia; Kermadec Islands; Hawaii.

Aristeus varidens Holthuis, 1952a. Eastern Atlantic Ocean from Western Sahara to Namibia.

Aristeus virilis (Bate, 1881). East coast of South Africa; Mozambique; Zanzibar; Madagascar; Réunion; Andaman Islands; Indonesia; Philippines; Taiwan; Japan; New South Wales, Australia; Fiji; New Caledonia; New Hebrides.

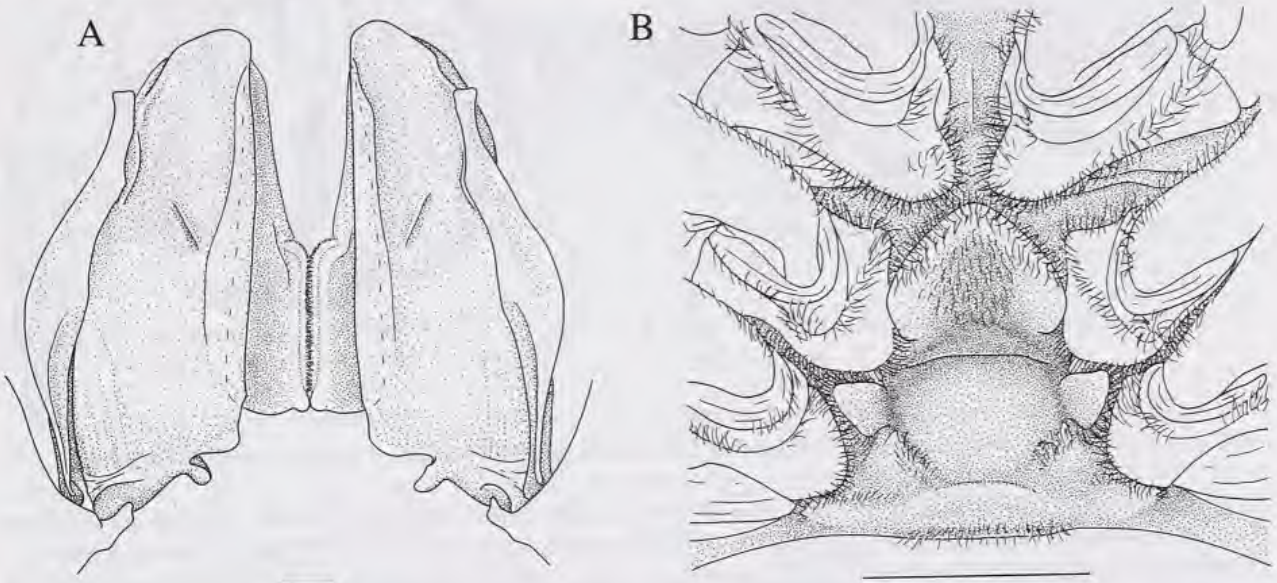


FIG. 10. — *Aristeus antennatus*: **A**, ♂ 33 mm cl, off Sicily, Mediterranean. Petasma, ventral view. Scale = 1 mm. — **B**, ♀ 50 mm cl, Indian Ocean off South Africa. Thelycum. Scale = 5 mm.

Genus ***Austropenaeus*** new genus

Figures 11-12

Plesiopenaeus non Bate - BARNARD, 1947, Ann. Mag. nat. Hist., (11)13: 383; 1950, Ann. S. Afr. Mus., 38: 622 [part]. — CROSNIER, 1978, Faune Madagascar, 46: 9, 88-90.

TYPE SPECIES: By present designation, *Plesiopenaeus nitidus* Barnard, 1947, Ann. Mag. nat. Hist., (11)13: 383.

TYPE LOCALITY: Off Cape Point, South Africa, 870-1153 m.

GENDER: Masculine.

DIAGNOSIS. — Adult males markedly smaller than adult females. Integument glabrous. Rostrum similar in males and females, up to 1.5 times longer than carapace in adults, bearing

Source : MNHN, Paris

2 basal teeth followed by single postrostral tooth. Carapace with antennal and branchiostegal spines on anterior margin, latter with fairly strong supporting carina; orbital, postantennal, and hepatic spines absent; postrostral carina not quite reaching midlength of carapace; cervical sulcus only distinguishable ventrolaterally; hepatic sulcus weak; branchiocardiac carina weak. First and second abdominal somites dorsally rounded; third somite posteriorly weakly carinate, fourth to sixth somites strongly carinate, third to sixth somites each ending in small middorsal spine. Telson acute, with 3 pairs of movable lateral spines in posterior half.

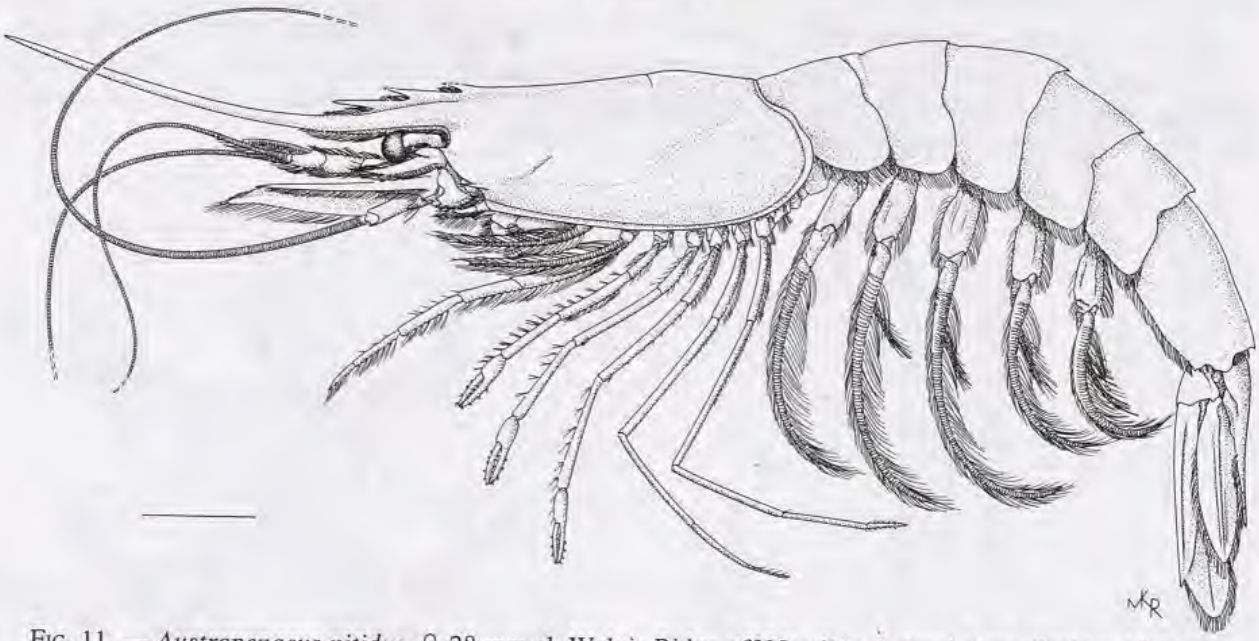


FIG. 11. — *Austropenaeus nitidus*, ♀ 28 mm cl, Walvis Ridge off Namibia. Lateral view. Scale = 10 mm.

Eye with cornea slightly flattened; calathus with strong mesiodistal tubercle. Dorsal antennular flagellum short, reaching apex of scaphocerite, flattened for most of its length; ventral antennular flagellum elongate, terete, in male having proximal sinuosity formed by several dilated articles at level of apex of dorsal antennular flagellum. Scaphocerite with lateral marginal ridge ending in short spine at about four-fifths length of blade. Third maxilliped of adult male with dactyl shorter and basally thicker than in adult female. First to fifth pereopods each having rudimentary exopod; first to third pereopods each with distal movable meral spine; fourth and fifth pereopods more slender than preceding ones. Third pereopod bearing rudimentary podobranchia.

Distribution of branchiae, epipods, and exopods in the genus *Austropenaeus*.

Somite	VII (Mxp1)	VIII (Mxp2)	IX (Mxp3)	X (P1)	XI (P2)	XII (P3)	XIII (P4)	XIV (P5)
Pleurobranchiae	-	-	1	1	1	1	1	1
Arthrobranchiae	s	s+1	2	2	2	2	2	-
Podobranchiae	-	1	1	1	1	r	-	-
Epipods	1	1	1	1	1	1	1	-
Exopods	1	1	1	r	r	r	r	r

Petasma with dorsolateral lobule produced into elliptical narrow process, conspicuously surpassing ventromedian lobule; ventral costa distally expanded into subcircular lobe. Thelycum

Source : MNHN, Paris

open, with apically pointed shieldlike median protuberance on sternite XIII; sternite XIV with low anteriorly pointed median prominence and paired short anterolateral ridges.

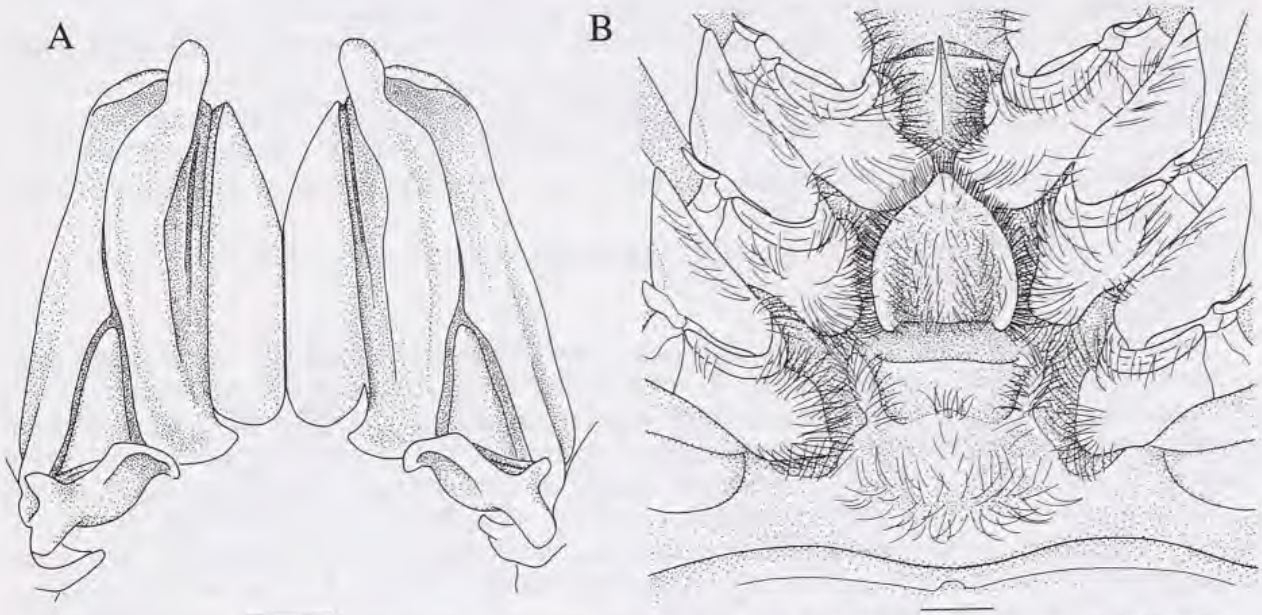


FIG. 12. — *Austropenaeus nitidus*: **A**, ♂ 22 mm cl, Walvis Ridge off Namibia. Petasma, dorsal view. — **B**, ♀ 29 mm cl, Walvis Ridge off Namibia. Thelycum. Scales = 1 mm.

REMARKS. — The anomalous position of *Plesiopenaeus nitidus* Barnard within the definition of typical *Plesiopenaeus*, was pointed out by CROSNIER (1978: 88, table 11). At least two characters used in the latter table, however, were erroneous, due to the lack of material on which to base conclusions. Examination of specimens reveals at least four characters that distinguish this species both from *Plesiopenaeus* and *Aristaeopsis*: the podobranch of the third pereopod is reduced; the ventral antennular flagellum in the male is modified; the third maxilliped in the adult male is modified; the carinae of the carapace are very feebly developed. In addition, the first to third pereopods each bear a distal movable meral spine.

The modification of the ventral antennular flagellum in the male of *A. nitidus* resembles the condition found in the genus *Aristeus*. The latter, however, possesses a relatively elongate eyestalk, an unflattened cornea, lacks exopods on the pereopods, a podobranch on the third pereopod, and an epipod on the fourth. Because of these differences, *A. nitidus* cannot be included in the genus *Aristeus*.

SPECIES. — *Austropenaeus nitidus* (Barnard, 1947). South-east Atlantic Ocean off Cape of Good Hope; South Atlantic Ocean, Valdivia Bank; off Natal, South Africa; off St. Paul and Amsterdam Islands; Bass Strait, Australia.

Genus ***Hemipenaeus*** Bate, 1881

Figures 13-14

Hemipenaeus Bate, 1881, Ann. Mag. nat. Hist., (5)8: 171, 186; 1888, Rep. scient. Results Voy. Challenger, 24: 299. — DE MAN, 1911, Siboga Exped., 39a: 23 [part]. — BURKENROAD, 1936b, Bull. Bingham oceanogr.

Source : MNHN, Paris

Coll., 5(2): 90. — RAMADAN, 1938, Scient. Rep. John Murray Exped., 5(3): 47 [part]. — ANDERSON and LINDNER, 1943, Trans. Am. Fish. Soc., 73: 300. — ROBERTS and PEQUEGNAT, 1970, Texas A&M Univ. Oceanogr. Stud., 1: 43. — CROSNIER, 1978, Faune Madagascar, 46: 74.

Placed on the Official List of Generic Names in Zoology, International Commission on Zoological Nomenclature, 1969, Opinion 864, Name No. 1813, Bull. zool. Nom., 25(4/5): 139.

Hemipeneus - FAXON, 1895, Mem. Mus. comp. Zool. Harv., 18: 198. — BURKENROAD, 1983, Crust. Issues, 1: 282.

Aristaeus (Hemipeneus) - ALCOCK, 1901, Descr. Cat. Indian Deep- Sea Crust., : 31 [part].

Hemypenaeus - KIKUCHI and NEMOTO, 1986, Bull. biogeogr. Soc. Japan, 41(7): 52.

TYPE SPECIES: By subsequent designation, by FAXON, 1895, *Hemipenaeus spinidorsalis* Bate, 1881, Ann. Mag. nat. Hist., (5)8: 186.

TYPE LOCALITY: South Atlantic Ocean off Tristan da Cunha, 35°41'S, 20°55'W, 3477 m.

GENDER: Masculine.

DIAGNOSIS. — Integument glabrous. Rostrum either moderately elongate in females and short in males, or short in both sexes, bearing 2, occasionally 3 basal dorsal teeth, followed by single postrostral tooth. Carapace with antennal and branchiostegal spines, latter continuous with sharp carina; orbital, postantennal, pterygostomian, and hepatic spines absent; postrostral carina reaching to midlength or almost to posterior margin of carapace; cervical sulcus either almost reaching middorsal line, or only demarked ventrally, if at all; postcervical sulcus present or absent; hepatic sulcus strong; branchiostegal carina well marked; branchiocardiac carina and sulcus strong. First and second abdominal somites dorsally rounded, third to sixth somites dorsally carinate, third somite armed with spiniform process arising from posterior third of

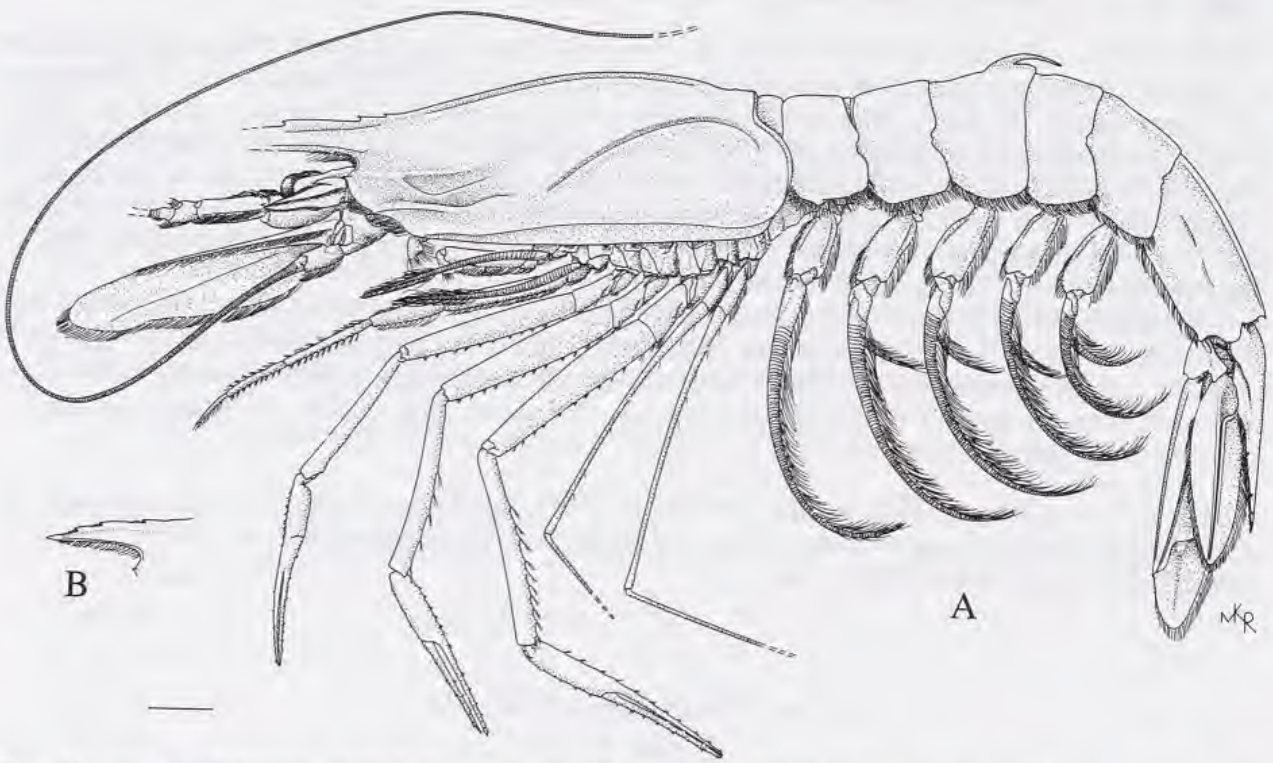


FIG. 13. — *Hemipenaeus spinidorsalis*: **A**, ♀ 65.5 mm cl, off Galapagos, Ecuador. Lateral view. — **B**, ♂ 44 mm cl., *ibidem*. Rostrum. Scale = 10 mm.

Source : MNHN, Paris

carina; sixth somite with small middorsal spine on posterior margin. Telson bearing 4 pairs of small movable lateral spines in about posterior half; apex acute.

Eye with cornea well developed, somewhat dorsoventrally flattened; calathus with strong tubercle at about midpoint of mesial margin. Dorsal antennular flagellum short, flattened for most of its length; ventral flagellum elongate, slender, terete, not modified in mature male. Scaphocerite with apex of blade rounded, lateral marginal ridge ending in spine at about distal fourth of length of lamella. First to fifth pereopods each with reduced exopod; meri of pereopods lacking distal movable spine; fourth and fifth pereopods very slender. Third pereopod bearing podobranchia; rudimentary epipod on fourth pereopod.

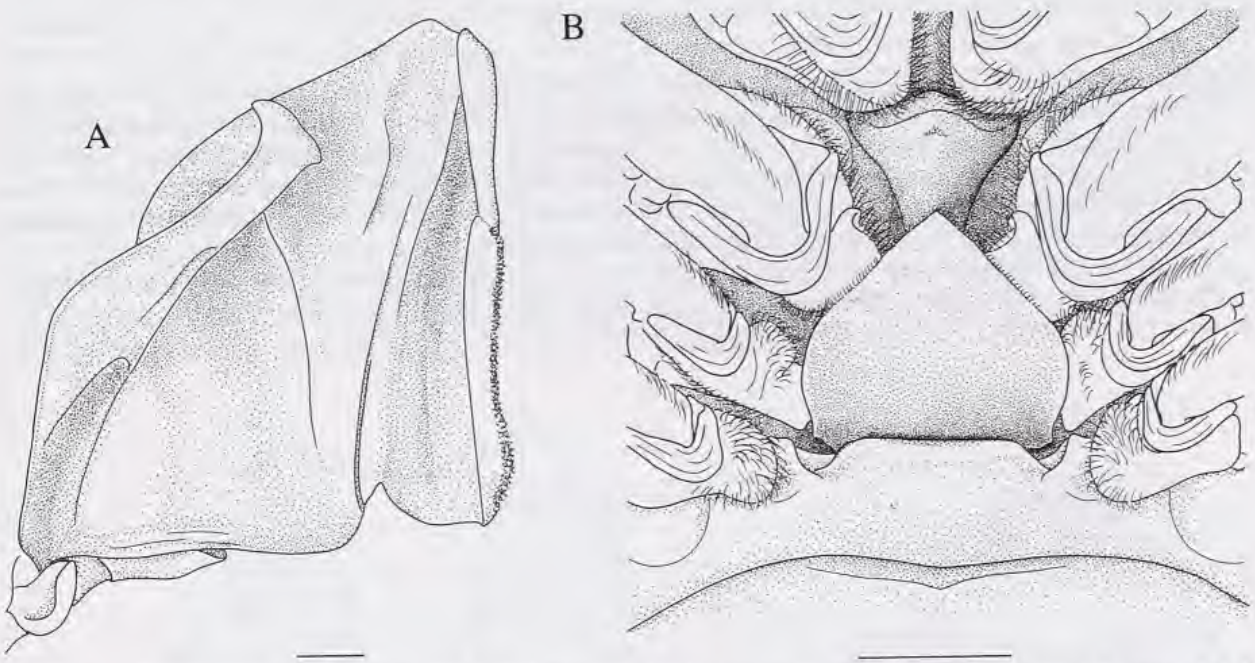


FIG. 14. — *Hemipenaeus spinidorsalis*: **A**, ♂ 44 mm cl, off Galapagos, Ecuador. Petasma, ventral view of right half. Scale = 1 mm. — **B**, ♀ 65.5 mm cl, off Galapagos, Ecuador. Thelycum. Scale = 5 mm.

Petasma with distal margin of dorsolateral lobule oblique, mesially reaching as far as ventromedian lobule; ventral costa free distally for about half or one-third of its length. Thelycum open, with broad anteriorly acute median protuberance on sternite XIII; sternite XIV broad, short, roughly rectangular.

Distribution of branchiae, epipods, and exopods in the genus *Hemipenaeus*.

Somite	VII (Mxp1)	VIII (Mxp2)	IX (Mxp3)	X (P1)	XI (P2)	XII (P3)	XIII (P4)	XIV (P5)
Pleurobranchiae	-	-	1	1	1	1	1	1
Arthrobranchiae	1	s+1	2	2	2	2	2	-
Podobranchiae	-	1	1	1	1	1	-	-
Epipods	1	1	1	1	1	1	r	-
Exopods	1	1	1	r	r	r	r	r

Source : MNHN, Paris

SPECIES. — *Hemipenaeus carpenteri* Wood-Mason, 1891. Eastern Pacific Ocean off Gulf of Panama; Galapagos Islands; western Atlantic Ocean off Bahamas; Gulf of Mexico; Caribbean; Madagascar; Réunion; Arabian Sea; central Indian Ocean; Bay of Bengal; Java Sea; Japan; Wallis and Futuna Islands.

Hemipenaeus spinidorsalis Bate, 1881. Eastern Pacific Ocean off Gulf of Panama; Galapagos Islands; South Atlantic Ocean off Tristan da Cunha; Madagascar; central Indian Ocean; Philippines; north-west Pacific Ocean.

Genus ***Hepomadus*** Bate, 1881

Figures 15-16

Hepomadus Bate, 1881, Ann. Mag. nat. Hist., (5)8: 171, 189; 1888, Rep. scient. Results Voy. Challenger, 24: 319. — BOUVIER, 1908a, Résult. Camp. scient. Prince Albert I, 33: 56. — A. MILNE EDWARDS and BOUVIER, 1909, Mem. Mus. comp. Zool. Harv., 27: 194. — BURKENROAD, 1936b, Bull. Bingham oceanogr. Coll., 5(2): 86. — RAMADAN, 1938, Scient. Rep. John Murray Exped., 5(3): 55. — ANDERSON and LINDNER, 1943, Trans. Am. Fish. Soc., 73: 300. — PÉREZ FARFANTE, 1973, Fish. Bull. U.S., 71(2): 441. — CROSNIER, 1978, Faune Madagascar, 46: 47. — BURKENROAD, 1983, Crust. Issues, 1: 281.

Placed on the Official List of Generic Names in Zoology, International Commission on Zoological Nomenclature, 1969, Opinion 864, Name No. 1814, Bull. zool. Nom., 25(4/5): 139.

Aristaeus (Hepomadus) - ALCOCK, 1901, Descr. Cat. Indian Deep-Sea Crust., : 42.

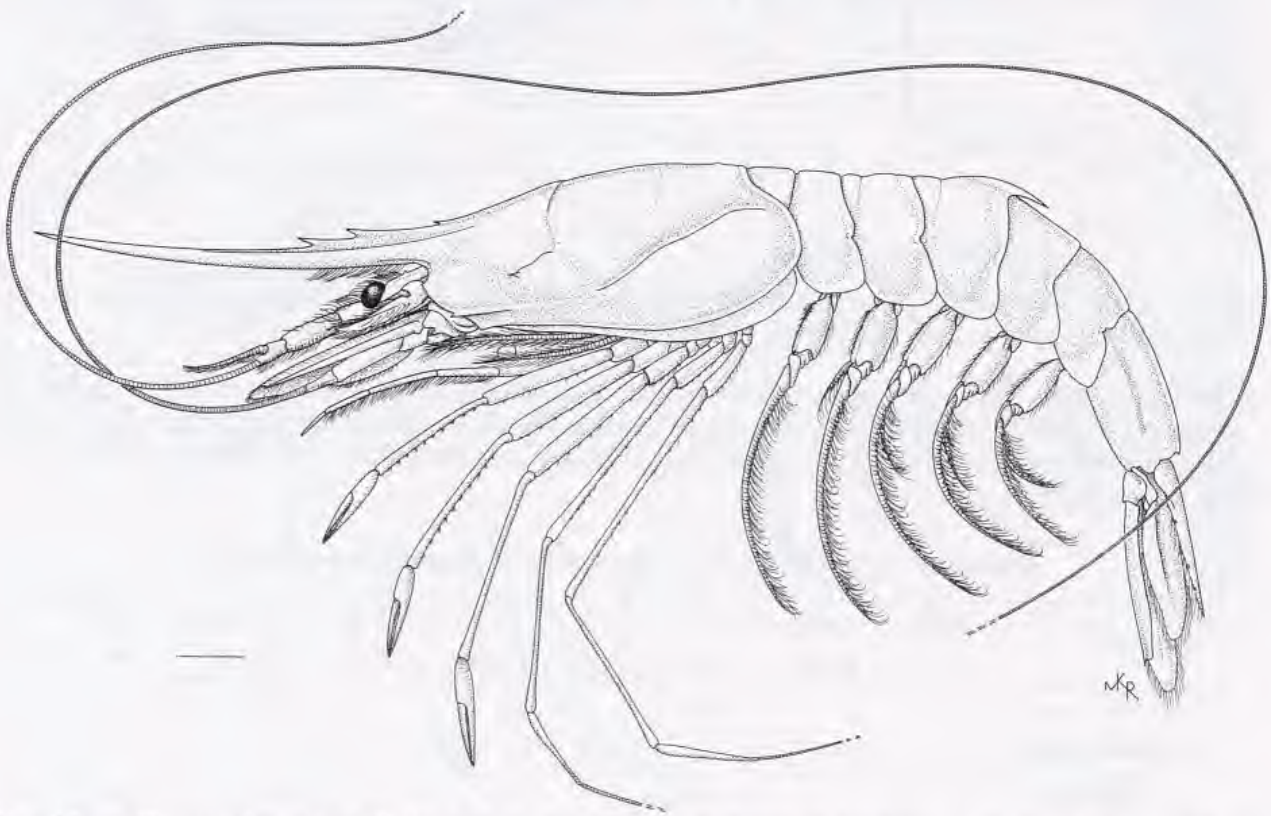


FIG. 15. — *Hepomadus tener*, ♀ 51 mm cl, off Mobile, Alabama. Lateral view. Scale = 10 mm. (From PÉREZ FARFANTE, 1973).

Source : MNHN, Paris

TYPE SPECIES: By subsequent designation, by FOWLER, 1912, *Hepomadus glacialis* Bate, 1881, Ann. Mag. nat. Hist., (5)8: 190.

TYPE LOCALITY: Off Yokohama, 34°37'N, 140°32'E, 3431 m.

GENDER: Masculine.

DIAGNOSIS. — Integument glabrous. Rostral length in young females and apparently, in all males, not exceeding 0.7 times that of carapace, in larger females length increasing to as much as 1.25 carapace length, reaching beyond distal end of antennular peduncle by half its length, bearing 2 dorsal teeth near base, followed by single postrostral tooth. Carapace with postrostral carina almost reaching posterior margin; antennal and marginal branchiostegal spines present; orbital, postantennal, and pterygostomian spines absent; hepatic spine present; cervical sulcus well marked, reaching middorsal line; postcervical sulcus faint; branchiostegal carina anteriorly sharp, posteriorly weak; hepatic sulcus distinct; branchiocardiac carina strong, accompanying sulcus deep. First and second abdominal somites dorsally rounded; third to sixth somites dorsally carinate, third somite carinate in posterior two-thirds, ending posteriorly in spine. Telson with 4 pairs of lateral movable spines; apex slender, acute.

Eye with cornea well developed; calathus with proximal tubercle on mesial margin. Dorsal antennular flagellum short, flattened for most of its length; ventral flagellum elongate, slender, terete, not modified in mature male. Scaphocerite blade distally rounded, rigid lateral margin with tooth at distal 5/6 of length. First to fifth pereopods each with exopod reduced or absent; merus of first and second pereopods with distal movable spine; fourth and fifth pereopods slender. Third pereopod lacking podobranchia; somite XIV lacking arthrobranchia.

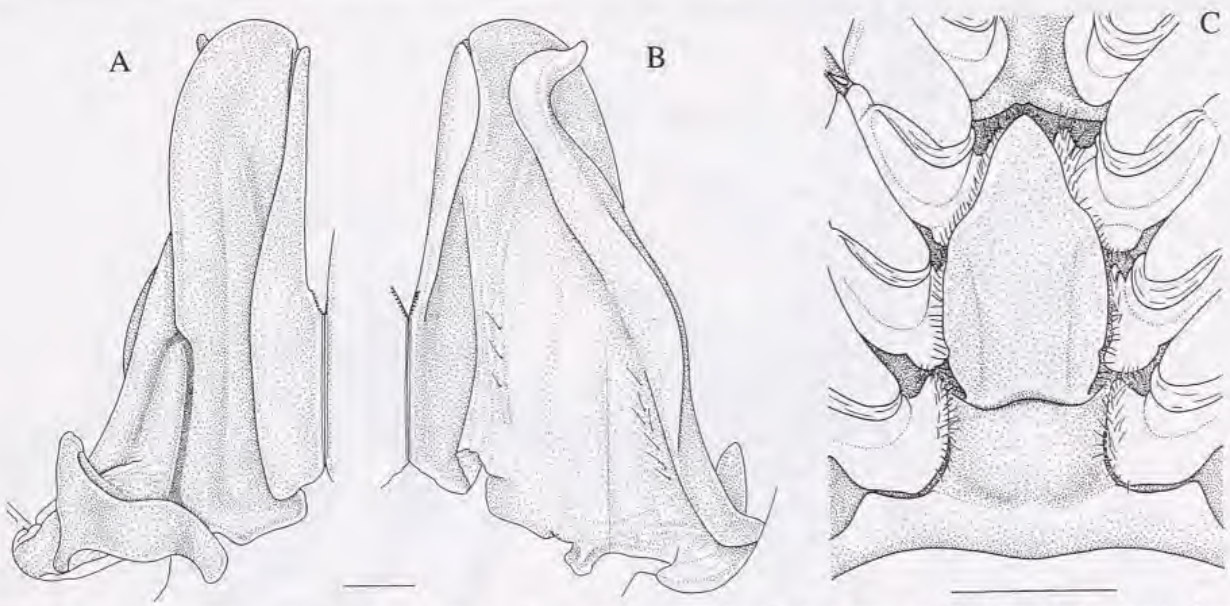


FIG. 16. — *Hepomadus tener*: **A-B**, ♂ 47 mm cl, southeast of Cabo Rojo, Veracruz, Mexico. **A**, Petasma, dorsal view. **B**, *Idem*, ventral view. — **C**, ♀ 47 mm cl, off Back Bay, Virginia. Thelycum. Scales = 1 mm. (All drawings from PÉREZ FARFANTE, 1973).

Petasma with dorsomedian lobule distally flexed laterally; dorsolateral lobule reaching or barely surpassing median lobe; about distal half of ventral costa free from adjacent flexible part of ventrolateral lobule, its tip curving laterally, forming sinuous projection. Thelycum open, with large roughly lanceolate median protuberance on sternite XIII; sternite XIV subrectangular, weakly convex.

Source : MNHN, Paris

Distribution of branchiae, epipods, and exopods in the genus *Hepomadus*.

Somite	VII (Mxp1)	VIII (Mxp2)	IX (Mxp3)	X (P1)	XI (P2)	XII (P3)	XIII (P4)	XIV (P5)
Pleurobranchiae	-	-	1	1	1	1	1	1
Arthrobranchiae	1	r+1	2	2	2	2	2	-
Podobranchiae	-	1	1	1	1	-	-	-
Epipods	1	1	1	1	1	1	r	-
Exopods	1	1	1	r	r	r	r	-

SPECIES. — *Hepomadus glacialis* Bate, 1881. Japan.

Hepomadus inermis Bate, 1881. South-central Pacific Ocean.

Hepomadus tener Smith, 1884. Western Atlantic Ocean; Gulf of Mexico; eastern Caribbean Sea; Sargasso Sea; Azores, north-eastern Atlantic Ocean; Cape Verde Islands, Zanzibar; Madagascar; Réunion; central Indian Ocean; Bay of Bengal; Wallis and Futuna Islands.

Genus ***Parahepomadus*** Crosnier, 1978

Figures 17-18

Parahepomadus Crosnier, 1978, Faune Madagascar, 46: 47.

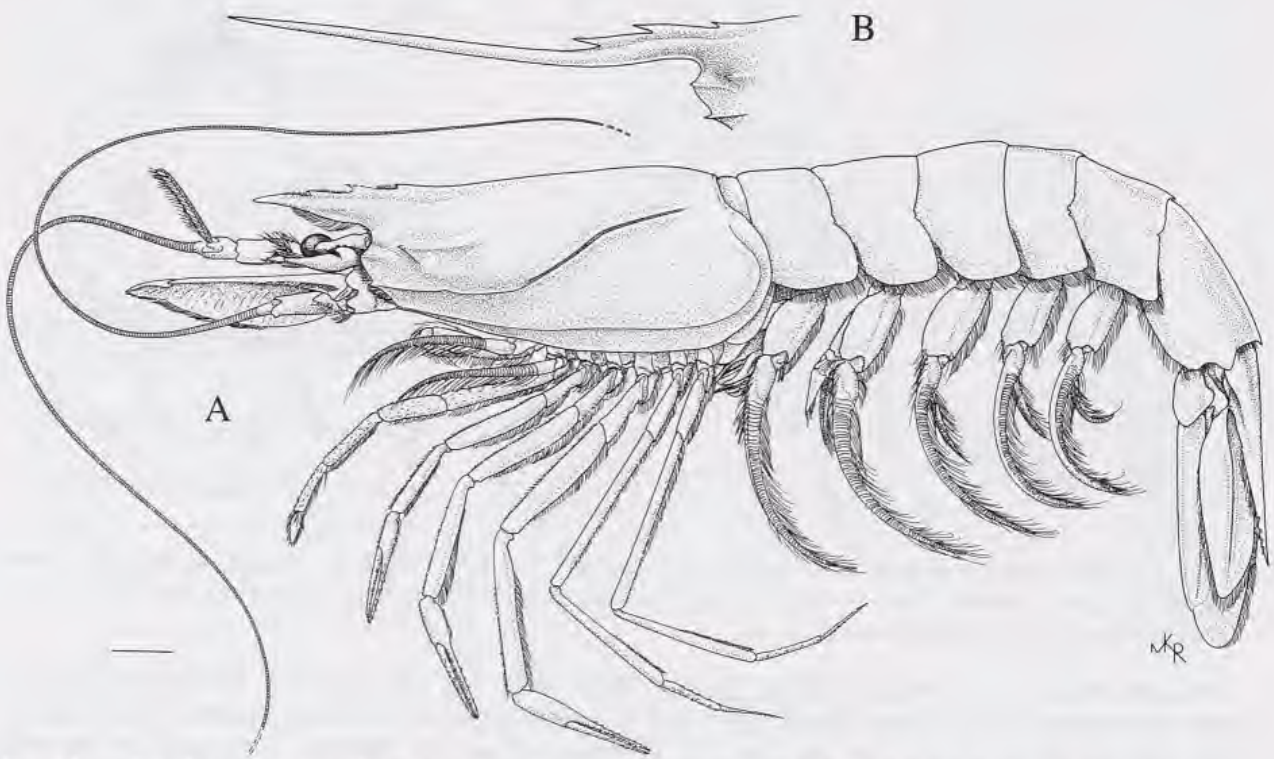


FIG. 17. — *Parahepomadus vaubani*: **A**, ♂ 58 mm cl, 16 km northeast of North Island, Indonesia, lateral view. — **B**, ♀ 23.5 mm cl, rostral region. Scale for both drawings = 10 mm. (B from CROSNIER, 1978).

Source : MNHN, Paris

TYPE SPECIES: By original designation, *Parahepomadus vaubani* Crosnier, 1978, Faune Madagascar, 46: 48, figs 20-22.

TYPE LOCALITY: Northwest and west coast of Madagascar, 880-1200 m.

GENDER: Masculine.

DIAGNOSIS. — Integument pubescent. Rostrum elongate in females and young males, reaching well beyond antennular peduncle; relatively short in adult males, reaching distal end of second segment of antennular peduncle; armed with 2 dorsal teeth at base, followed by single postrostral tooth. Carapace with antennal, postantennal, and branchiostegal spines, latter supported by elongate carina. Orbital, hepatic, and pterygostomian spines absent. Postrostral carina reaching to about midlength of carapace. Cervical sulcus only ventrally visible; hepatic sulcus well marked, continuous with branchiocardiac sulcus. First to third abdominal somites dorsally rounded, fourth to sixth somites dorsally carinate. Telson apically acute, with 4 pairs of movable spines in posterior fourth.

Eye with well developed cornea; calathus with small conical tubercle on mesial margin. Dorsal antennular flagellum short, flattened for most of its length; ventral flagellum elongate, filiform, terete, with distinct proximal sinuosity formed by several dilated articles in male. Scaphocerite with lateral marginal ridge ending in short spine at about five-sixths length of blade; distal margin of latter oblique-truncate. First to fifth pereopods lacking exopods; first and second pereopods with subdistal movable spine on merus; fourth and fifth pereopods more slender than preceding ones. Third pereopod lacking podobranchia.

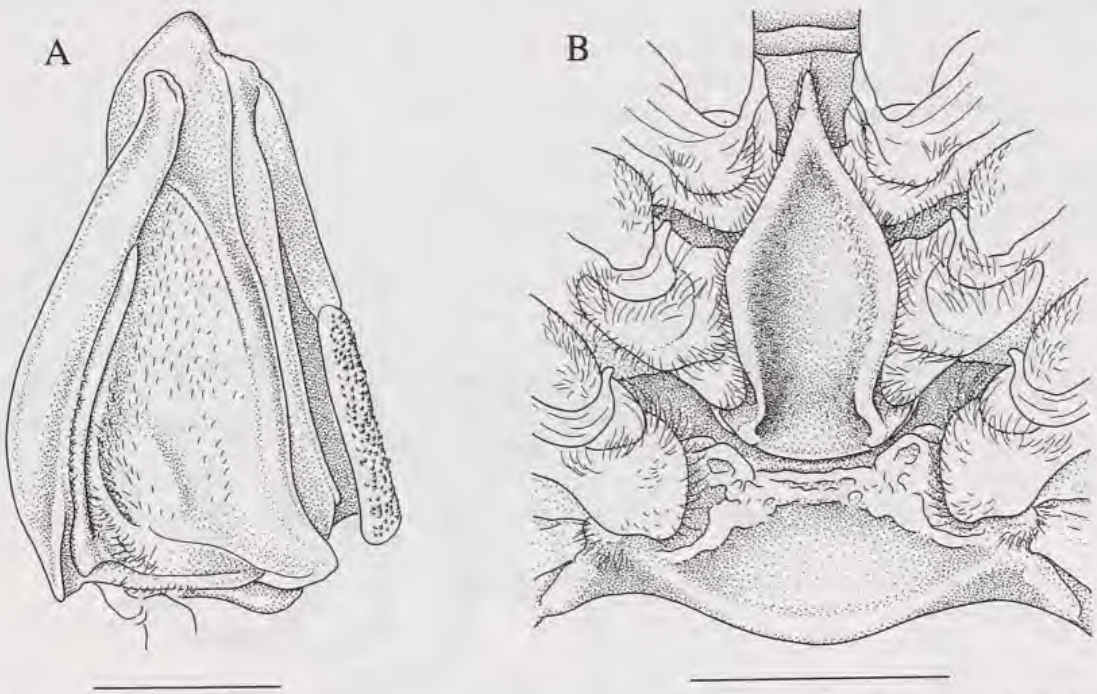


FIG. 18. — *Parahepomadus vaubani*: **A**, ♂ 55 mm cl, off Madagascar. Petasma, ventral view of right half. Scale = 5 mm. — **B**, ♀ 75.5 mm cl, off Madagascar. Thelycum. Scale = 10 mm. (Both drawings from CROSNIER, 1978).

Petasma with dorsolateral lobule distally rounded, slightly surpassing median lobe; ventral costa free from adjacent flexible part of ventrolateral lobule for one-third of its length. Thelycum

Source : MNHN, Paris

open, with large lanceolate median protuberance on sternite XIII; sternite XIV anteriorly with narrow rugose area, broad posterior area flattened.

Distribution of branchiae, epipods, and exopods in the genus *Parahepomadus*.

Somite	VII (Mxp1)	VIII (Mxp2)	IX (Mxp3)	X (P1)	XI (P2)	XII (P3)	XIII (P4)	XIV (P5)
Pleurobranchiae	-	-	1	1	1	1	1	1
Arthrobranchiae	1	s+1	2	2	2	2	2	-
Podobranchiae	-	1	1	1	1	-	-	-
Epipods	1	1	1	1	1	1	s	-
Exopods	1	1	1	-	-	-	-	-

SPECIES. — *Parahepomadus vaubani* Crosnier, 1978. Off Madagascar; Indonesia; Philippines.

Genus ***Plesiopenaeus*** Bate, 1881

Figures 19-20

Aristeus - Bate, 1881, Ann. Mag. nat. Hist., (5)8: 187 [part]; 1888, Rep. scient. Results Voy. Challenger, 24: 309 [part].

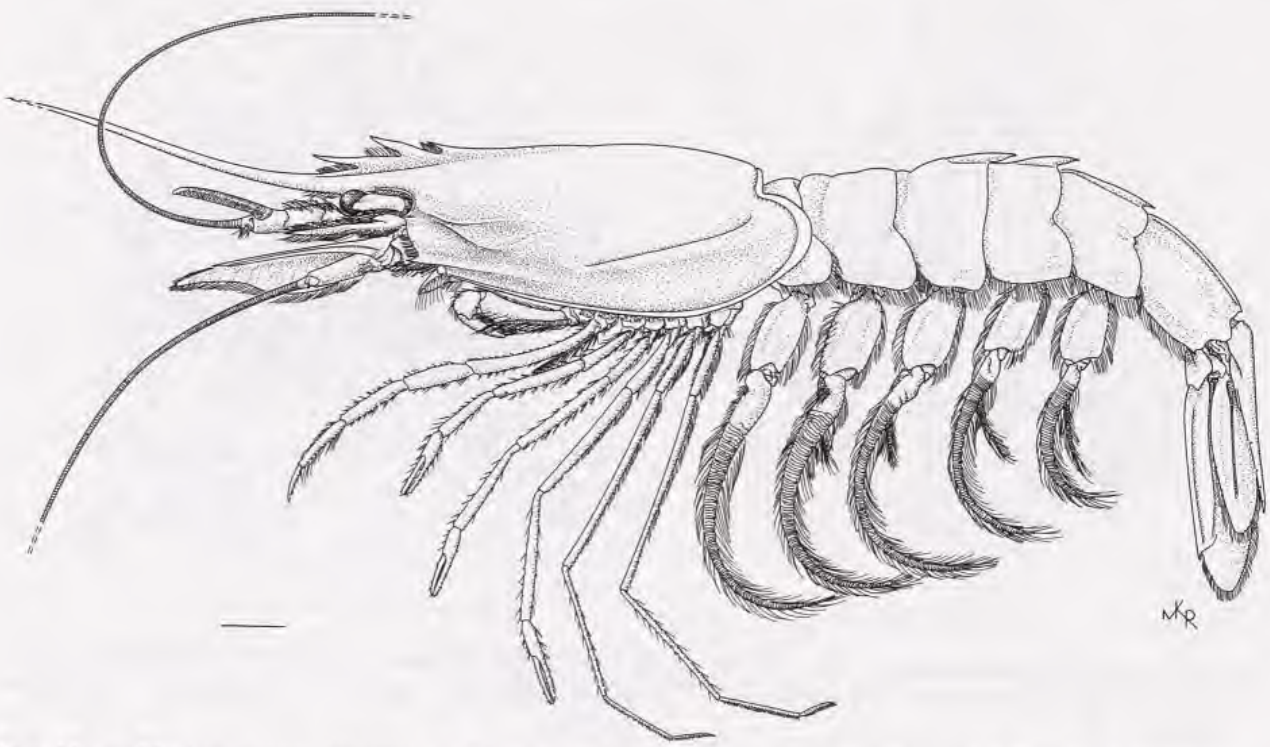


FIG. 19. — *Plesiopenaeus armatus*, ♀ 78 mm cl, North Atlantic Ocean off North Carolina. Lateral view. Scale = 10 mm.

Source : MNHN, Paris

Aristaeus - WOOD-MASON, 1891, Ann. Mag. nat. Hist., (6)8: 278 [part].

Plesiopenaeus Bate, 1881, Ann. Mag. nat. Hist., (5)8: 188. — BOUVIER, 1908a, Résult. Camp. scient. Prince Albert I, 33: 63 [part]. — BURKENROAD, 1936b, Bull. Bingham oceanogr. Coll., 5(2): 94. — RAMADAN, 1938, Scient. Rep. John Murray Exped., 5(3): 49 [part]. — ANDERSON and LINDNER, 1943, Trans. Am. Fish. Soc. 73: 301. — BARNARD, 1950, Ann. S. Afr. Mus., 38: 621. — CROSNIER, 1978, Faune Madagascar, 46: 85. — DE FREITAS, 1985, Investl. Rep. oceanogr. Res. Inst., Durban, 57: 20. — SQUIRES, 1990, Can. Bull. Fish. Aq. Sci., 221: 41.

Placed on the Official List of Generic Names in Zoology, International Commission on Zoological Nomenclature, 1969, Opinion 864, Name No. 1823, Bull. zool. Nom., 25(4/5): 139.

Plesiopeneus - FAXON, 1895, Mem. Mus. comp. Zool. Harv., 18: 199. — BURKENROAD, 1983, Crust. Issues, 1: 281.

Aristeopsis - BOUVIER, 1908a, Résult. Camp. scient. Prince Albert I, 33: 61. — A. MILNE EDWARDS and BOUVIER, 1909, Mem. Mus. comp. Zool. Harv., 27: 197.

TYPE SPECIES: By subsequent designation, by FAXON, 1895, *Aristeus armatus* Bate, 1881, Ann. Mag. nat. Hist., (5)8: 188.

TYPE LOCALITY not restricted, seven syntypes from following localities: Off Buenos Aires, Argentina, 35°39'S, 50°47'W, 3477 m; South Atlantic Ocean off Tristan da Cunha, 35°41'S, 20°55'W, 3477 m; Torres Strait, 12°08'S, 145°10'E, 2562 m; Off Philippines, 5°47'N, 124°01'E, 3750 m; Off Yokohama, Japan, 34°37'N, 140°32'E, 3430 m; Central North Pacific Ocean, 36°10'N, 178°00'E, 3750 m; Off Low Archipelago, Pacific Ocean, 13°28'S, 149°30'W, 4300 m.

GENDER: Masculine.

DIAGNOSIS. — Integument glabrous. Rostrum elongate, reaching beyond antennular peduncle by as much as one and one-third its length in adult females, short in adult males, bearing 2 basal dorsal teeth, followed by single postrostral tooth. Carapace with antennal and branchiostegal spines present on anterior margin; orbital, postantennal, pterygostomian, and hepatic spines absent. Cervical sulcus either almost reaching middorsal line, or only demarked laterally; gastro-orbital, antennal, hepatic, and branchiocardiac carinae well marked; postrostral carina reaching at least to midlength of carapace. First and second abdominal somites dorsally rounded; posterior half of third abdominal somite and fourth to sixth somites dorsally carinate. Telson with 4 pairs of movable lateral spines in posterior half; apex acute.

Eye with cornea slightly flattened; calathus moderately elongate, with strong tubercle at about midlength of mesial margin. Dorsal antennular flagellum flattened for most of its length; ventral antennular flagellum elongate, slender, terete, not modified in adult male. Scaphocerite with lateral marginal ridge ending in short spine at about distal five-sixths length of lamella. First to fifth pereopods each with rudimentary exopod; first pereopod, or first and second pereopods with distal movable meral spine. Fourth and fifth pereopods more slender than preceding ones. Third pereopod with well developed podobranchia; large epipod on fourth pereopod.

Distribution of branchiae, epipods, and exopods in the genus *Plesiopenaeus*.

Somite	VII (Mxp1)	VIII (Mxp2)	IX (Mxp3)	X (P1)	XI (P2)	XII (P3)	XIII (P4)	XIV (P5)
Pleurobranchiae	-	-	1	1	1	1	1	1
Arthrobranchiae	s	s+1	2	2	2	2	2	-
Podobranchiae	-	1	1	1	1	1	-	-
Epipods	1	1	1	1	1	1	s	-
Exopods	1	1	1	r	r	r	r	r

Source : MNHN, Paris

Petasma with distal margin of dorsolateral lobule oblique, mesially reaching as far as median lobe; ventral costa free distally, its rounded or subacute apical part directed laterally. Thelycum open, with shield-like median protuberance on sternite XIII anteriorly acute; sternite XIV roughly rectangular.

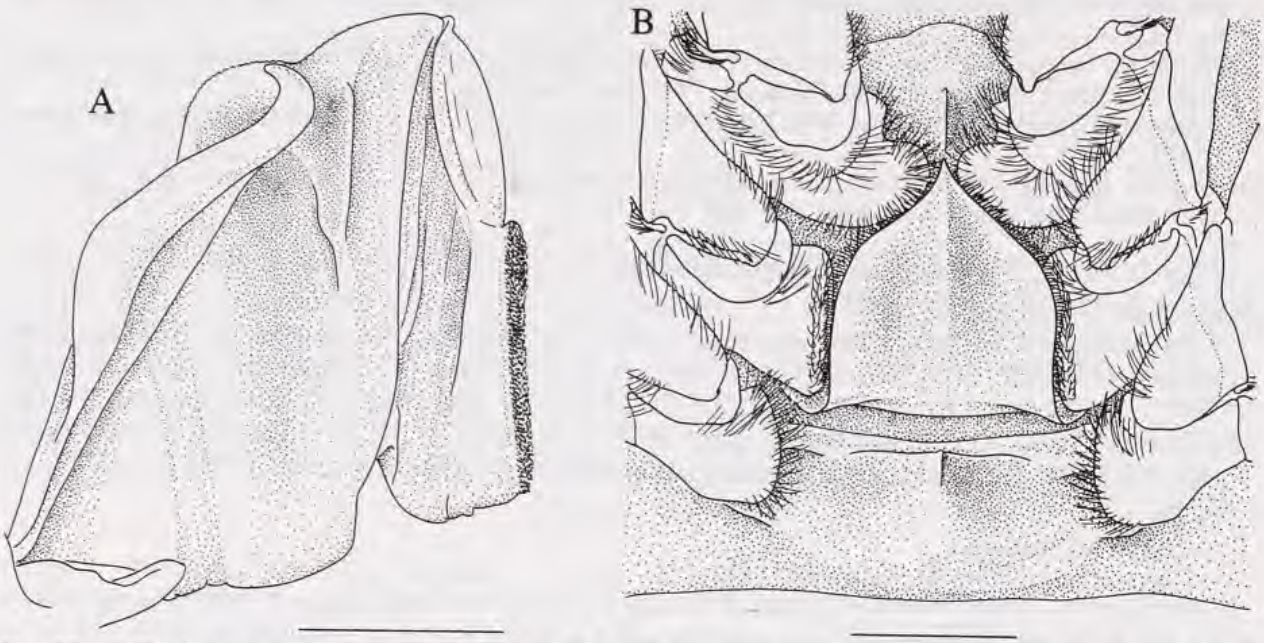


FIG. 20. — *Plesiopenaeus armatus*: **A**, ♂ 74 mm cl, North Atlantic Ocean off North Carolina. Petasma. — **B**, ♀ 78 mm cl, North Atlantic Ocean off North Carolina. Thelycum. Scales = 5 mm.

SPECIES. — *Plesiopenaeus armatus* (Bate, 1881). Off north-west coast of U.S.A.; Western Atlantic Ocean; Gulf of Mexico; eastern Atlantic Ocean off Azores; Madeira; Canary Islands; Cape Verde Islands; Tristan da Cunha; Zanzibar; Madagascar; Maldive Islands; Chagos Archipelago; Bay of Bengal; Philippines; Japan; north-west Pacific Ocean; Tuamotu Islands; Wallis and Futuna Islands; Hawaii.

Plesiopenaeus coruscans (Wood-Mason, 1891). Gulf of Mexico; Bahamas; Madagascar; Arabian Sea; Bay of Bengal; Andaman Islands.

Genus ***Pseudaristeus*** Crosnier, 1978

Figures 21-23

Hemipenaeus - BATE, 1881, Ann. Mag. nat. Hist., (5)8: 186 [part]. — RAMADAN, 1938, Scient. Rep. John Murray Exped., 5(3): 47 [part].
Aristaeus - WOOD-MASON, 1891, Ann. Mag. nat. Hist., (6)8: 278 [part].
Aristaeus (Hemipeneus) - ALCOCK, 1901, Descr. Cat. Indian Deep- Sea Crust., : 31 [part].
Pseudaristeus Crosnier, 1978, Faune Madagascar, 46: 81. — DE FREITAS, 1985, Investl. Rep. oceanogr. Res. Inst., Durban, 57: 11. — PÉREZ FARFANTE, 1987, Fish. Bull., U. S., 85(2): 312.

TYPE SPECIES: By original designation, *Aristeus crassipes* Wood-Mason, 1891, Ann. Mag. nat. Hist., (6)8: 281.

Source : MNHN, Paris

TYPE LOCALITY: Andaman Sea, 741 m.
GENDER: Masculine.

DIAGNOSIS. — Integument pubescent. Rostrum elongate in juvenile males and adult females, reaching well beyond scaphocerite; fairly short in most adult males, not reaching apex of scaphocerite; bearing 2 dorsal basal teeth, followed by single postrostral tooth. Carapace with antennal and marginal branchiostegal spines; orbital, postantennal, pterygostomian, and hepatic spines absent; postrostral carina, hepatic sulcus and cervical and postcervical sulci well demarked, latter reaching or almost reaching middorsal line; branchiostegal-hepatic carina strong; branchiocardiac carina and sulcus well marked. First to third abdominal somites dorsally rounded, fourth to sixth somites dorsally carinate; fourth somite carinate only in posterior two-thirds. Telson with slender acute apex, with 4 pairs of movable lateral spines in posterior half.

Eye with cornea well developed, dorsoventrally flattened; calathus with small tubercle on mesial margin. Dorsal antennular flagellum short, flattened for most of its length, ventral

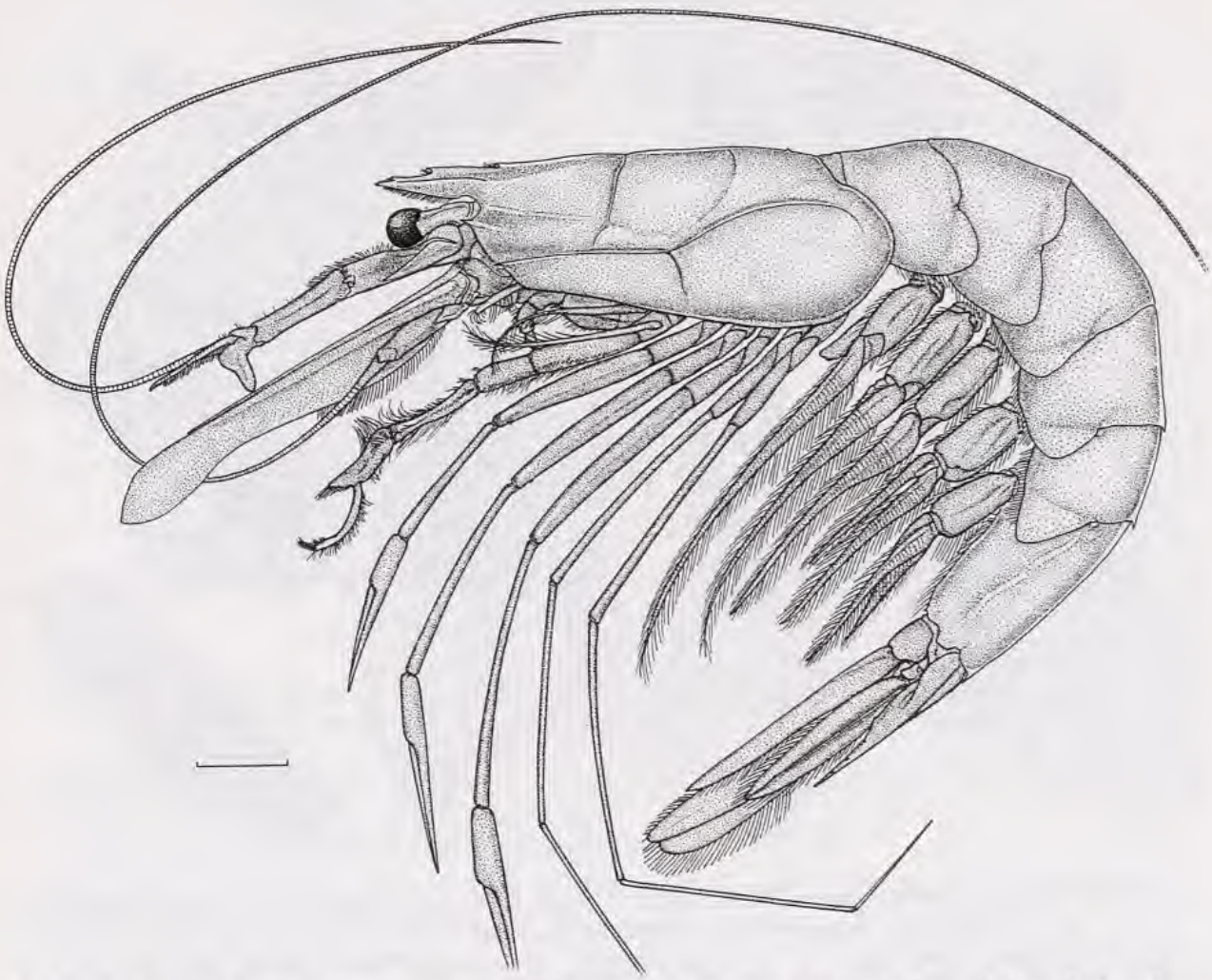


FIG. 21. — *Pseudaristeus kathleenae*, holotype, ♂ 23.5 mm cl, Sulawesi, Indonesia. Lateral view. Scale = 6 mm. (From PÉREZ FARFANTE, 1987).

Source : MNHN, Paris

flagellum elongate terete, with proximal sinuosity in males of *P. gracilis* only. Scaphocerite with lamella distal to lateral spine broadly rounded. First to fifth pereopods lacking exopods; first and second pereopods with subdistal movable spine on meri; fourth and fifth pereopods more slender than preceding ones. Third pereopod lacking podobranchia.

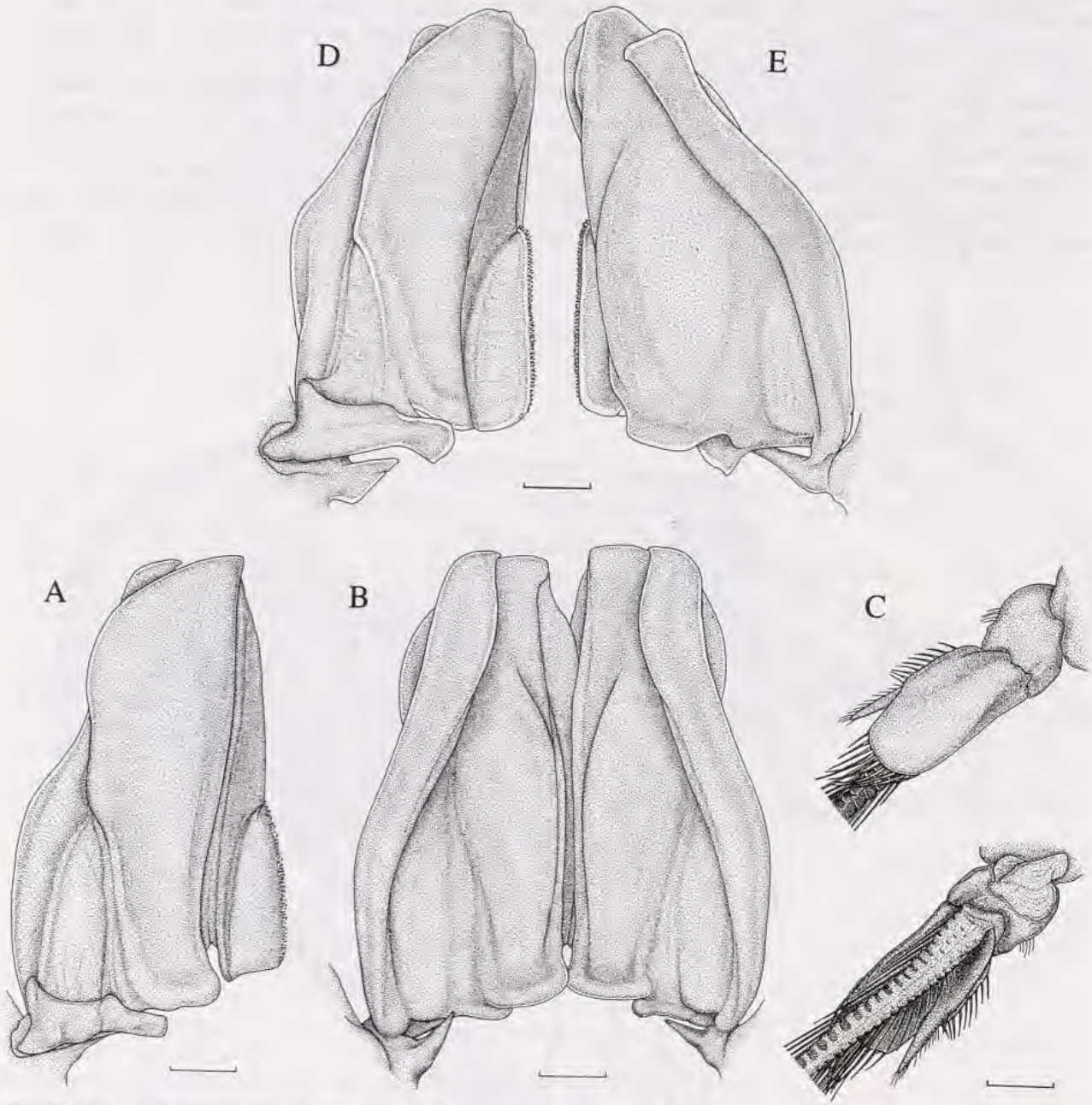


FIG. 22 A-C. — *Pseudaristeus kathleenae*, holotype, ♂ 23.5 mm cl, Sulawesi, Indonesia: **A**, Petasma, dorsolateral view of left half. **B**, *Idem*, ventral view. **C**, Appendix masculina, appendix interna, and basal sclerite of pleopod 2 endopod, dorsal view and ventral view. Scales = 1 mm. (From PÉREZ FARFANTE, 1987).
FIG. 22 D-E. — *Pseudaristeus crassipes*, ♂ 26.5 mm cl, South of Cape Comorin, India: **D**, Petasma, dorsal view. **E**, *Idem*, ventral view. Scale = 1 mm. (From PÉREZ FARFANTE, 1987).

Source : MNHN, Paris

Petasma with distal margin of dorsolateral lobule slightly to strongly oblique, mesially reaching or slightly surpassing median lobe; ventral costa distally free for about half its length and turning slightly to strongly mesially. Thelycum open, with large lanceolate median protuberance on sternite XIII; sternite XIV forming broad plate produced into anterolateral hoods, delimiting anterior depression flanked by rugose area.

Distribution of branchiae, epipods, and exopods in the genus *Pseudaristeus*.

Somite	VII (Mxp1)	VIII (Mxp2)	IX (Mxp3)	X (P1)	XI (P2)	XII (P3)	XIII (P4)	XIV (P5)
Pleurobranchiae	-	-	1	1	1	1	1	1
Arthrobranchiae	r	r+1	2	2	2	2	2	-
Podobranchiae	-	1	1	1	1	-	-	-
Epipods	1	1	1	1	1	1	-	-
Exopods	1	1	1	-	-	-	-	-

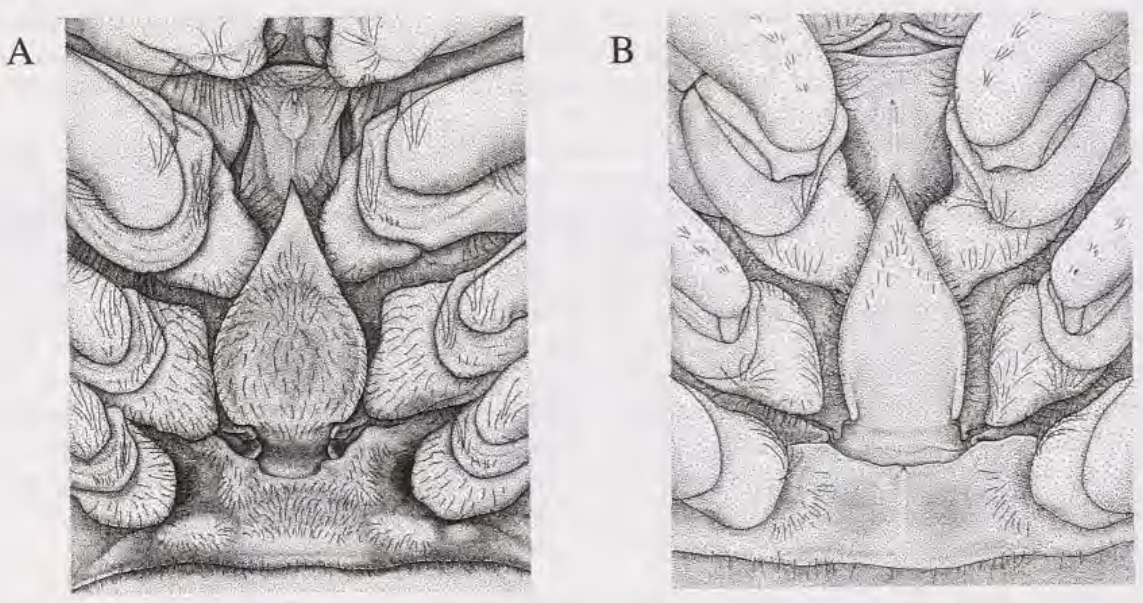


FIG. 23. — **A**, *Pseudaristeus kathleenae*, ♀ 47 mm cl, Lagonoy Gulf, east of southern Luzon, Philippines. Thelycum. — **B**, *Pseudaristeus crassipes*, ♀ 36 mm cl, Straits of Makassar, Indonesia. Thelycum. Scales = 2 mm. (All drawings from PÉREZ FARFANTE, 1987).

SPECIES. — *Pseudaristeus crassipes* (Wood-Mason, 1891). Gulf of Aden; central Indian Ocean; India; Sri Lanka; Bay of Bengal; Indonesia.

Pseudaristeus gracilis (Bate, 1888). Philippines.

Pseudaristeus kathleenae Pérez Farfante, 1987. Gulf of Aden; India; Indonesia; Philippines.

Pseudaristeus protensus Pérez Farfante, 1987. Arabian Sea; Bay of Bengal.

Pseudaristeus sibogae (De Man, 1911). Natal, South Africa; Madagascar; Saya de Malha Bank; Indonesia.

Pseudaristeus speciosus (Bate, 1881). Argentina Basin.

Source : MNHN, Paris

Family BENTHESICYMIDAE Wood-Mason, 1891

Benthesicymina Wood-Mason, 1891, Ann. Mag. nat. Hist., (6)8: 286.
Benthesicymae - Bouvier, 1908a, Résult. Camp. scient. Prince Albert I, 33: 16. — Burkenroad, 1936b, Bull. Bingham Oceanogr. Coll., 5(2): 15. — Anderson and Lindner, 1943, Trans. Am. Fish. Soc., 73: 290. — Balss, 1957, Bronn's Kl. Ordn. Tierreichs, 5(1)7(12): 1517. — Tirmizi, 1960, Scient. Rep. John Murray Exped., 10(7): 321. — Roberts and Pequegnat, 1970, Texas A&M Univ. Oceanogr. Stud., 1: 32.
Penaeidae - Barnard, 1950, Ann. S. Afr. Mus., 38: 580 [part].
Benthesicyminae - Crosnier, 1978, Faune Madagascar, 46: 14. — Hayashi, 1992, Dendr. Crust. Jap. Waters : 36. Placed on the Official List of Family-Group Names in Zoology, International Commission on Zoological Nomenclature, 1969, Opinion 864, Bull. zool. Nom., 25(4/5): 141.
Benthesicymini - Burkenroad, 1983, Crust. Issues, 1: 281, 286.

Diagnosis. — Integument thin, soft, flexible. Rostrum short, not reaching beyond eyes, laterally compressed, dorsal rostral/postrostral teeth no more than 3, usually 2 or less, ventrally unarmed. Carapace with branchiostegal spine; hepatic spine present or absent; postorbital and postantennal spines lacking; cervical and postcervical sulcus reaching middorsal line; branchiocardiac and hepatic sulci usually well defined. Abdominal somites variously carinate, occasionally ending in posterior spine. Telson bearing 1 to 4 pairs of lateral movable spines; apex usually truncate, sometimes acute.

Eye with optic calathus bearing mesial tubercle; ocular scale and styliform projection lacking. Antennule with prosartema usually represented by tuft of setae; with 2 elongate filiform flagella. Second pleopod of males with appendix masculina and appendix interna, lacking distolateral projection. Third through fifth pleopods biramous. Exopods on first to third maxillipeds, present or absent on first to fifth pereopods. Pleurobranchia present on somites IX to XIV; one arthrobranchia on somite VII, two on somites VIII to XIII; podobranchia on second and third maxillipeds and first to third pereopods, but only on second maxilliped in *Gennadas*; epipod present on second maxilliped to fourth or fifth pereopod.

Petasma open, generally broadly lamellar, with flexible part of ventrolateral lobule attached to dorsolateral for much of, or for its entire length; ventral costa entirely attached. Thelycum open or sometimes closed; in latter case having shallow seminal receptacles formed by sternal invaginations between sternites XII and XIII at base of third pereopods.

Key to the Genera of the Family BENTHESICYMIDAE

1. Podobranchia present on second maxilliped through third pereopod. Telson armed with more than one pair of movable lateral spines **2**
— Podobranchia present only on second maxilliped. Telson armed with only one pair of movable lateral spines ..... ***Gennadas***

2. Telson apically pointed. Several abdominal somites dorsally carinate **3**
— Telson apically truncate. Only sixth abdominal somite dorsally carinate ..... ***Bentheogennema***

3. Dactyls of fourth and fifth pereopods not multiarticulate or markedly elongate. Hepatic spine present or absent ..... ***Benthesicymus***
— Dactyls of fourth and fifth pereopods multiarticulate, markedly slender and elongate. Hepatic spine present ..... ***Benthonectes***

Source : MNHN, Paris

Genus ***Bentheogennema*** Burkenroad, 1936

Figures 24-25

Bentheogennema Burkenroad, 1936b, Bull. Bingham oceanogr. Coll., 5(2): 56. — Anderson and Lindner, 1943, Trans. Am. Fish. Soc., 73: 295. — Tirmizi, 1960, Scient. Rep. John Murray Exped., 10(7): 337. — Crosnier, 1978, Faune Madagascar, 46: 28. — Burkenroad, 1983, Crust. Issues, 1: 282. — Hayashi, 1992, Dendr. Crust. Jap. Waters, : 57.

Gennadas - Bate, 1888, Rep. scient. Results Voy. Challenger, 24: 343 [part].

Type Species: By original designation, *Gennadas intermedius* Bate, 1888, Rep. scient. Results Voy. Challenger, 24: 343.

Type Locality: North Atlantic Ocean, off Sierra Leone, 1°47'N, 24°26'W, 3385 m; North Atlantic Ocean between Bermuda and Azores, surface; South-east Atlantic Ocean, 35°59'S, 1°34'E, surface.

Gender: Feminine.

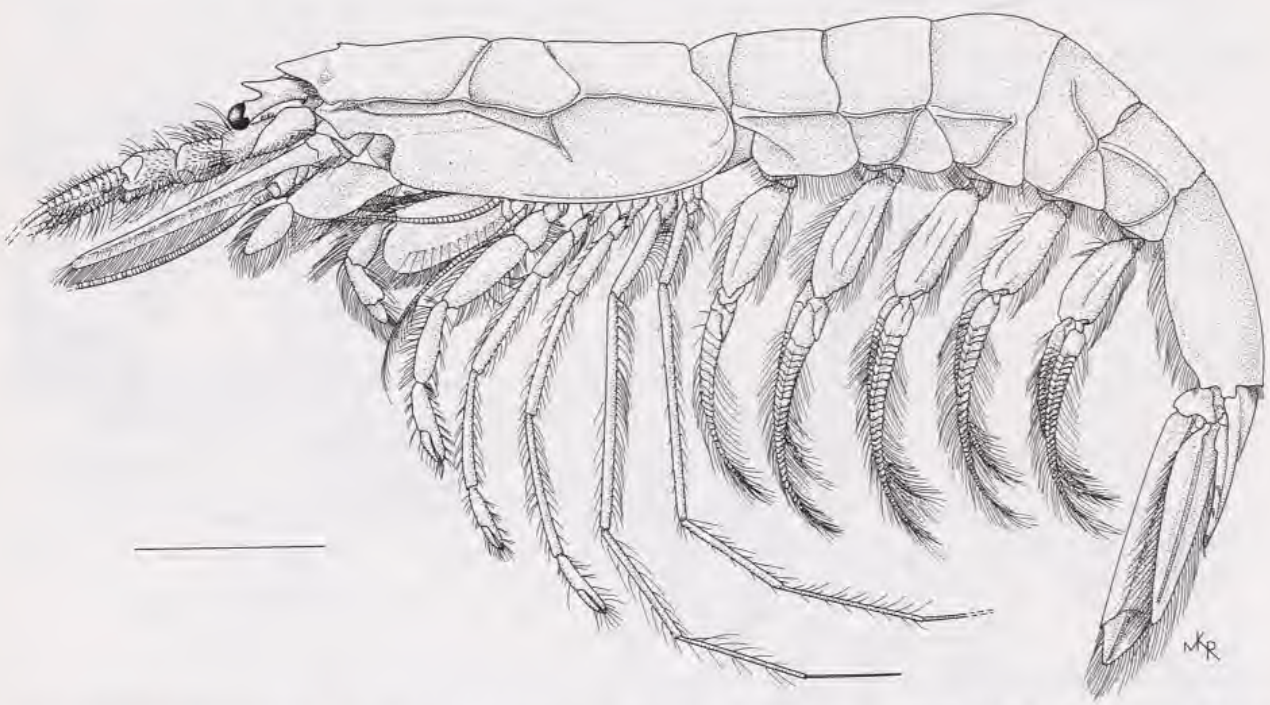


Fig. 24. — *Bentheogennema intermedia*, composite from several female specimens, Northwest Atlantic Ocean. Lateral view. Scale = 5 mm.

Diagnosis. — Integument soft, thin. Rostrum short, triangular, not reaching cornea of eye, apically acute, with one dorsal tooth; one postrostral tooth present in some species. Carapace lacking hepatic spine; small marginal branchiostegal spine present on anteroventral emargination of carapace; hepatic, suprahepatic, cervical, postcervical, and branchiocardiac sulci well marked, often further emphasized by carinae. First to fifth abdominal somites dorsally rounded; sixth somite dorsally carinate. Telson lacking, or with 1-4 pairs of movable lateral spines (usually with 2, rarely 1 or none); apically truncate.

Source : MNHN, Paris

Eye with cornea poorly-pigmented, barely wider than optic calathus; ocellus distinct; strong conical mesial tubercle at about midlength of optic calathus. Exopod of first maxilliped distally rounded, not segmented. Dactyli of fourth and fifth pereopods slender, consisting of single segment. Single podobranchia on second and third maxilliped and first three pereopods.

Petasma broad, with external, median, and internal lobes distally variously developed. Thelycum closed, with triangular plate on sternite XII, broader plates on sternites XIII and XIV; apertures of small seminal receptacles situated laterally between sternites XII and XIII.

Distribution of branchiae, epipods, and exopods in the genus *Bentheogennema*.

Somite	VII (Mxp1)	VIII (Mxp2)	IX (Mxp3)	X (P1)	XI (P2)	XII (P3)	XIII (P4)	XIV (P5)
Pleurobranchiae	-	-	1	1	1	1	1	1
Arthrobranchiae	1	2	2	2	2	2	2	-
Podobranchiae	-	1	1	1	1	1	-	-
Epipods	1	1	1	1	1	1	1	-
Exopods	1	1	1	-	-	-	-	-

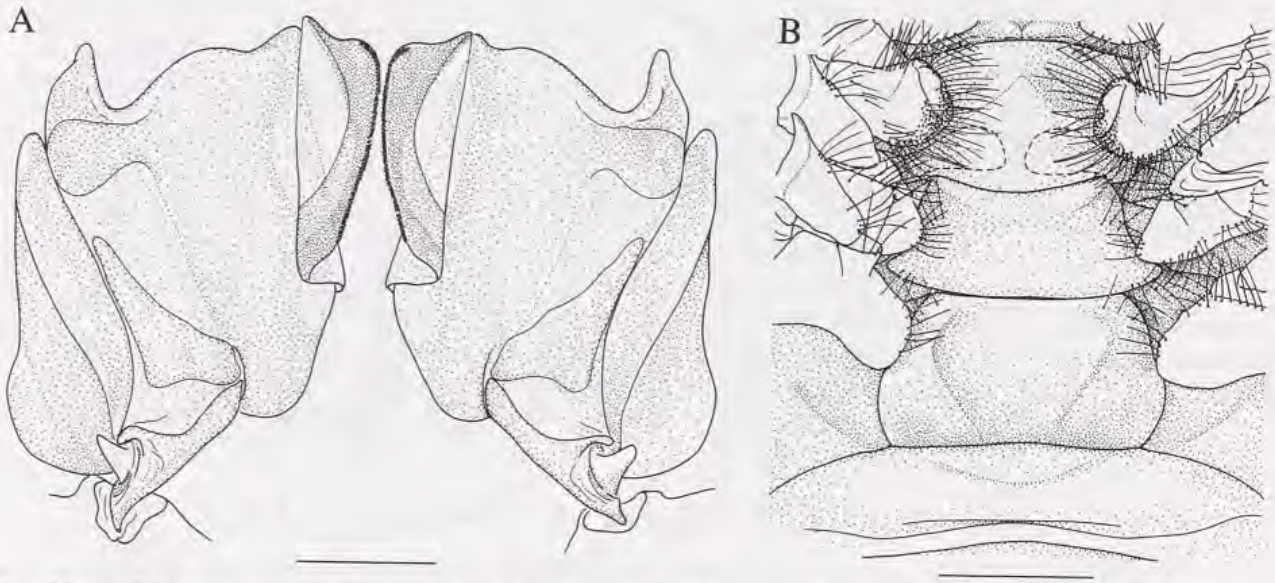


FIG. 25. — *Bentheogennema intermedia*: **A**, ♂ 16 mm cl, Northwest Atlantic Ocean. Petasma, dorsal view. — **B**, ♀ 14 mm cl, Northwest Atlantic Ocean. Thelycum. Scales = 1 mm.

SPECIES. — *Bentheogennema borealis* (Rathbun, 1902). North-west Pacific Ocean; Japan; Bering Strait to Baja California.

Bentheogennema burkenroadi Krygier and Wasmer, 1975. North-east Pacific Ocean; off Baja California.

Bentheogennema intermedia (Bate, 1888). Off Baja California; western Atlantic Ocean from Bermuda to Brazil; Gulf of Mexico; Bahamas; Gabon; Congo; south-east Atlantic Ocean off Cape of Good Hope; east coast of Africa; Zanzibar; Madagascar; Arabian Sea; Maldive Islands; north-west Pacific Ocean; Hawaii.

Source : MNHN, Paris

Bentheogennema pasithea (De Man, 1907). Off southern California, U.S.A. and Baja California; East coast of Africa; Madagascar; Seychelles; India; Indonesia; Taiwan; Caroline Islands; Gilbert Islands.

Bentheogennema stephenseni Burkenroad, 1940. Off Baja California; central Indian Ocean; off Kermadec Islands and New Zealand, south-eastern Pacific Ocean.

Genus ***Benthesicymus*** Bate, 1881

Figures 26-27

Benthesicymus Bate, 1881, Ann. Mag. nat. Hist., (5)8: 171, 190; 1888, Rep. scient. Results Voy. Challenger, 24: 326. — Alcock, 1901, Descr. Cat. Indian Deep-Sea Crust., : 42. — De Man, 1911, Siboga Exped., 39a: 13. — Burkenroad, 1936b, Bull. Bingham Oceanogr. Coll., 5(2): 23. — Anderson and Lindner, 1943, Trans. Am. Fish. Soc., 73: 296. — Tirmizi, 1960, Scient. Rep. John Murray Exped., 10(7): 322. — Crosnier, 1978, Faune Madagascar, 46: 15. — Burkenroad, 1983, Crust. Issues, 1: 282. — Squires, 1990, Can. Bull. Fish. Aq. Sci., 221: 21. — Kikuchi and Nemoto, 1991, J. Crust. Biol., 11(1): 64. — Hayashi, 1992, Dendr. Crust. Jap. Waters, : 37.

Placed on the Official List of Generic Names in Zoology, International Commission on Zoological Nomenclature, 1969, Opinion 864, Name No. 1808, Bull. zool. Nom., 25(4/5): 138.

Benthoecetes Smith, 1884, Rep. U. S. Commnr Fish., 1882: 391. Type species: By monotypy, *Benthesicymus bartletti* Smith, 1882, Bull. Mus. comp. Zool. Harv., 10: 82. Type locality: East coast of United States, 1076-1570 m.

Gennadas - Alcock, 1901, Descr. Cat. Indian Deep-Sea Crust., : 46 [part].

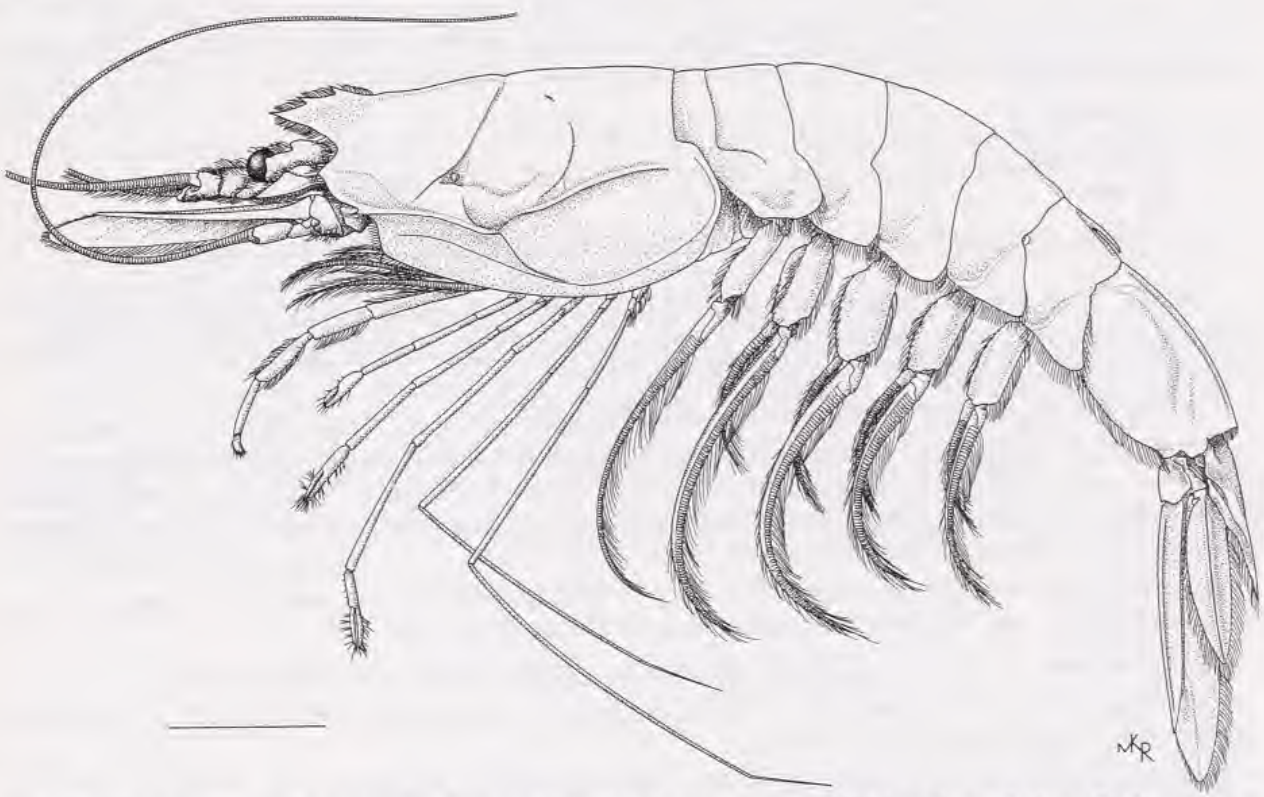


Fig. 26. — *Benthesicymus bartletti*, ♀ 26 mm cl, North Atlantic Ocean off U.S.A. Lateral view. Scale = 10 mm.

Source : MNHN, Paris

TYPE SPECIES: By subsequent designation, by BATE, 1888, Rep. scient. Results Voy. Challenger, 24: 329, *Benthesicymus crenatus* Bate, 1881, Ann. Mag. nat. Hist., (5)8: 190.

TYPE LOCALITY: Mid-Pacific Ocean off Low Archipelago, 3°48'S, 152°56'W, 4750 m; Mid-Pacific Ocean, 13°28'S, 149°30'W, 4300 m.

GENDER: Masculine.

DIAGNOSIS. — Integument thin to fairly firm. Rostrum short, falling short of, to barely overreaching, cornea of eye, triangular, apically acute, with 2 dorsal teeth. Carapace with marginal branchiostegal spine present, often supported by short carina; hepatic spine present or absent; cervical, postcervical, hepatic, and branchiocardiac sulci well marked. First to third abdominal somites dorsally rounded; posterior half of fourth somite, and fifth and sixth somites dorsally carinate. Telson with 4 pairs of movable lateral spines; apex acute.

Cornea of eye moderately well pigmented, slightly wider than eyestalk; conical mesiodorsal process at about midlength of eyestalk. Exopod of first maxilliped distally gently tapering to tip, or narrowing abruptly to segmented distal part. Dactyli of fourth and fifth pereopods slender, uniarticulate. Podobranchia on second maxilliped to third pereopod, one small arthrobranchia on first maxilliped and 2 on second maxilliped to fourth pereopod.

Petasma with dorsolateral lobule broad, distally sometimes bilobed, longer than ventrolateral lobule. Thelycum either lacking seminal receptacles, or with median plate of sternite XIII broad, having short submedian anterior lobes enclosing shallow seminal receptacles between sternites of somites XII and XIII.

Distribution of branchiae, epipods, and exopods in the genus *Benthesicymus*.

Somite	VII (Mxp1)	VIII (Mxp2)	IX (Mxp3)	X (P1)	XI (P2)	XII (P3)	XIII (P4)	XIV (P5)
Pleurobranchiae	-	-	1	1	1	1	1	1
Arthrobranchiae	s	2	2	2	2	2	2	-
Podobranchiae	-	1	1	1	1	1	-	-
Epipods	1	1	1	1	1	1	1	-
Exopods	1	1	1	s or r	s or r	s or r	s or r	s or r

SPECIES. — *Benthesicymus altus* Bate, 1881. California, U.S.A.; Gulf of Panama; Galapagos Islands; Tristan da Cunha; Madagascar; Comoro Islands; Réunion; Arabian Sea; Maldive Islands; Philippines; Japan; Coral Sea; Kermadec Islands; Fiji.

Benthesicymus armatus MacGilchrist, 1905. Arabian Sea.

Benthesicymus bartletti Smith, 1882. Western North Atlantic Ocean from Nova Scotia to Gulf of Mexico and Caribbean; Belize; Honduras; Colombia; Venezuela; Surinam; French Guiana; Azores; Canary Islands; Cape Verde Islands; Morocco; Mauritania; Gabon; Congo; Maldive Islands; Bay of Bengal; Philippines; north-west Pacific Ocean.

Benthesicymus brasiliensis Bate, 1881. Gulf of Mexico; off Buenos Aires; north-east Atlantic Ocean off Azores and Madeira; Atlantic Morocco; Tristan da Cunha.

Benthesicymus brevirostris Kikuchi and Nemoto, 1991. North-west Pacific Ocean.

Benthesicymus carinatus Smith, 1884. Caribbean; east coast of South Africa; Réunion; Arabian Sea; north-west Pacific Ocean.

Benthesicymus cereus Burkenroad, 1936b. Bahamas; New Zealand.

Benthesicymus crenatus Bate, 1881. Central Pacific Ocean; North-west Pacific Ocean.

Source : MNHN, Paris

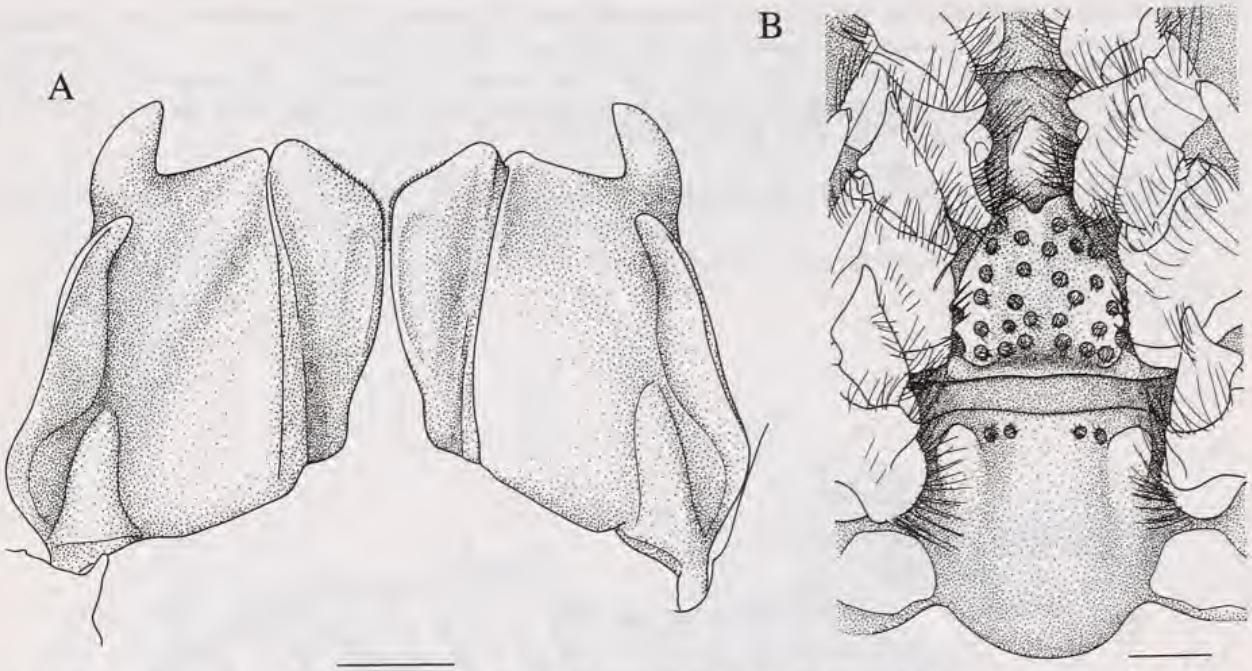


FIG. 27. — *Bentheogennema intermedia*: **A**, ♂ 16 mm cl, Northwest Atlantic Ocean. Petasma, dorsal view. — **B**, ♀ 14 mm cl, Northwest Atlantic Ocean. Thelycum. Scales = 1 mm.

Benthesicymus hjorti Sund, 1920. Canary Islands.

Benthesicymus investigatoris Alcock and Anderson, 1899. East coast of Africa; Gulf of Aden; Madagascar; Réunion; Saya de Malha Bank; Sri Lanka; Andaman Sea; Indonesia; Philippines; Japan; New South Wales, Australia; Kermadec Island; Wallis and Futuna Islands; Fiji; Hawaii; Sala-y-Gómez.

Benthesicymus iridescens Bate, 1881. Gulf of Mexico; Bahamas; north-east Atlantic Ocean off Azores and Madeira; Tristan da Cunha; central Indian Ocean; Solomon Islands; New Zealand; Fiji; North-west Pacific Ocean.

Benthesicymus laciniatus Rathbun, 1906. Southern California; Azores; Canary Islands; Madagascar; Réunion; Saya de Malha Bank; Japan; Hawaii.

Benthesicymus seymouri Tirmizi, 1960. Zanzibar; Madagascar.

Benthesicymus strabus Burkenroad, 1936b. South Pacific Ocean; north-west Pacific Ocean.

Benthesicymus tanneri Faxon, 1893. Off south-western U.S.A.; Pacific Mexico; Gulf of California; Pacific Panama; Colombia; Galapagos Islands; south-west Ilo, Peru.

Benthesicymus tirmiziae Crosnier, 1978. Madagascar; Maldive Islands; Saya de Malha Bank; Philippines.

Benthesicymus urinator Burkenroad, 1936b. Comoro Islands; Réunion; Torres Straits; North-west Pacific Ocean; Hawaii.

Genus ***Benthonectes*** Smith, 1885

Figures 28-29

Benthonectes Smith, 1885a, Proc. U. S. natn. Mus., 7: 509. — ANDERSON and LINDNER, 1943, Trans. Am. Fish. Soc., 73: 290. — TIRMIZI, 1960, Scient. Rep. John Murray Exped., 10(7): 333. — CROSNIER, 1978, Faune Madagascar, 46: 24.

Source : MNHN, Paris

Placed on the Official List of Generic Names in Zoology, International Commission on Zoological Nomenclature, 1969, Opinion 864, Name No. 1809, Bull. zool. Nom., 25(4/5): 138.

Hapalopoda Filhol, 1885a, La Nature, Paris, 13(2): 229. Type species: By monotypy, *Hapalopoda investigator* Filhol, 1885a, La Nature, Paris, 13(2): 229, fig. 2. Type locality: 33°9'N, 11°58'W (of Paris = 9°38'W of Greenwich) [see HOLTHUIS, 1980a, Zool. Meded. Leiden, 55(15): 183-187].

TYPE SPECIES: By monotypy, *Benthonectes filipes* Smith, 1885a, Proc. U. S. natn. Mus., 7: 509.

TYPE LOCALITY: Off New Jersey, 1268-1908 m.

GENDER: Masculine.

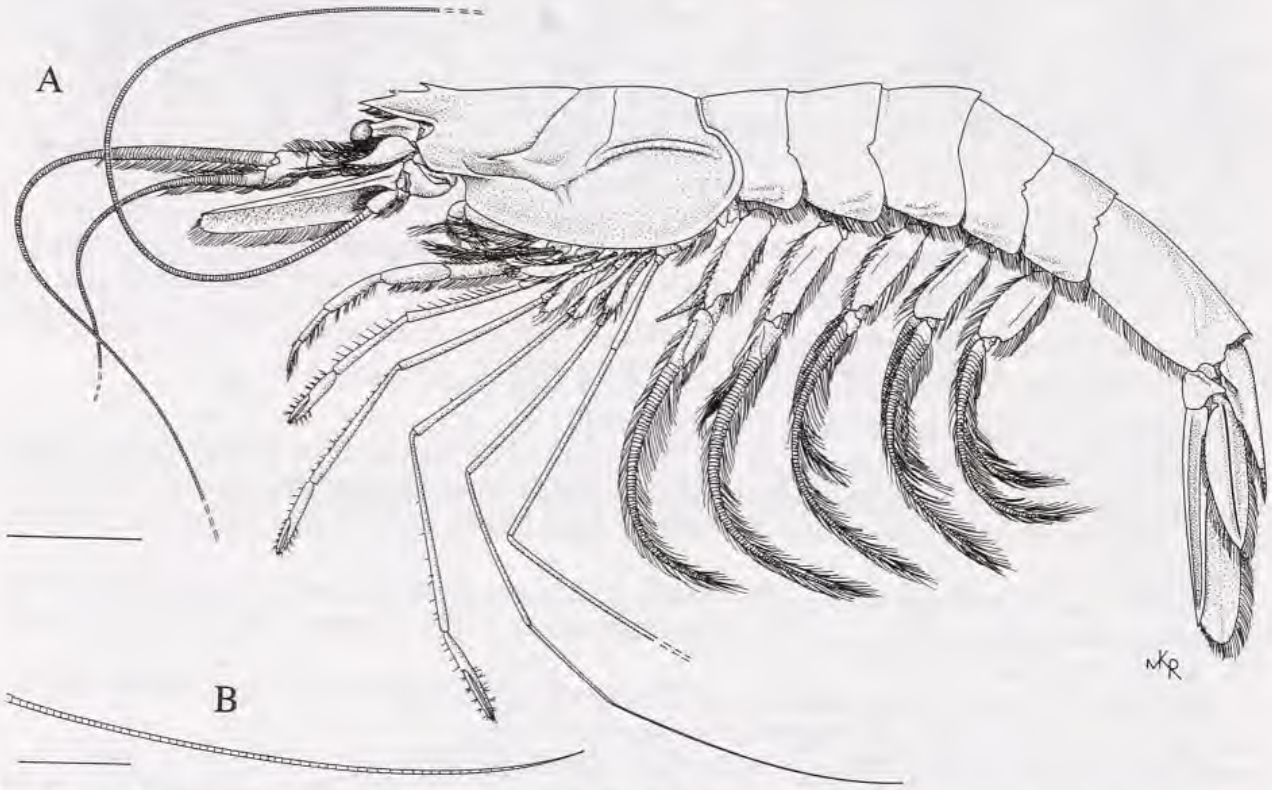


FIG. 28. — *Benthonectes filipes*: **A**, ♂ 19.8 mm cl, North Atlantic Ocean off Virginia, U.S.A. Lateral view. Scale = 10 mm. — **B**, Dactylus of pereopod 5 enlarged. Scale = 5 mm.

DIAGNOSIS. — Integument thin, fairly soft. Rostrum short, triangular, barely reaching, to slightly overreaching cornea of eye, bearing 2 dorsal teeth. Carapace with strong hepatic and carinate branchiostegal spines; cervical, postcervical, hepatic, and branchiocardiac sulci well marked. First to fourth abdominal somites dorsally rounded, fifth and sixth somites dorsally carinate. Telson with 4 pairs of movable lateral spines; apex acute.

Eye with cornea considerably wider than eyestalk, moderately well pigmented; eyestalk with small tubercle on short mesial margin. Exopod of first maxilliped narrowing rapidly to form slender multiarticulate section. Dactyli of fourth and fifth pereopods elongate, multiarticulate. Podobranchia present on second maxilliped to third pereopod, and one relatively large arthrobranchia on somite VII, and two from somite VIII to XIII.

Petasma consisting of single narrow, apically subacute lobe. Thelycum open, lacking seminal receptacles; with plate of sternite XIII raised into narrowly elongate-ovate process, anteriorly

Source : MNHN, Paris

rounded to subacute and free. Sternite XIV rectangular, overlapped laterally by basal lobe of fifth pereopods.

Distribution of branchiae, epipods, and exopods in the genus *Benthonectes*.

Somite	VII (Mxp1)	VIII (Mxp2)	IX (Mxp3)	X (P1)	XI (P2)	XII (P3)	XIII (P4)	XIV (P5)
Pleurobranchiae	-	-	1	1	1	1	1	1
Arthrobranchiae	1	2	2	2	2	2	2	-
Podobranchiae	-	1	1	1	1	s	-	-
Epipods	1	1	1	1	1	1	1	-
Exopods	1	1	1	s	s	s	s	s

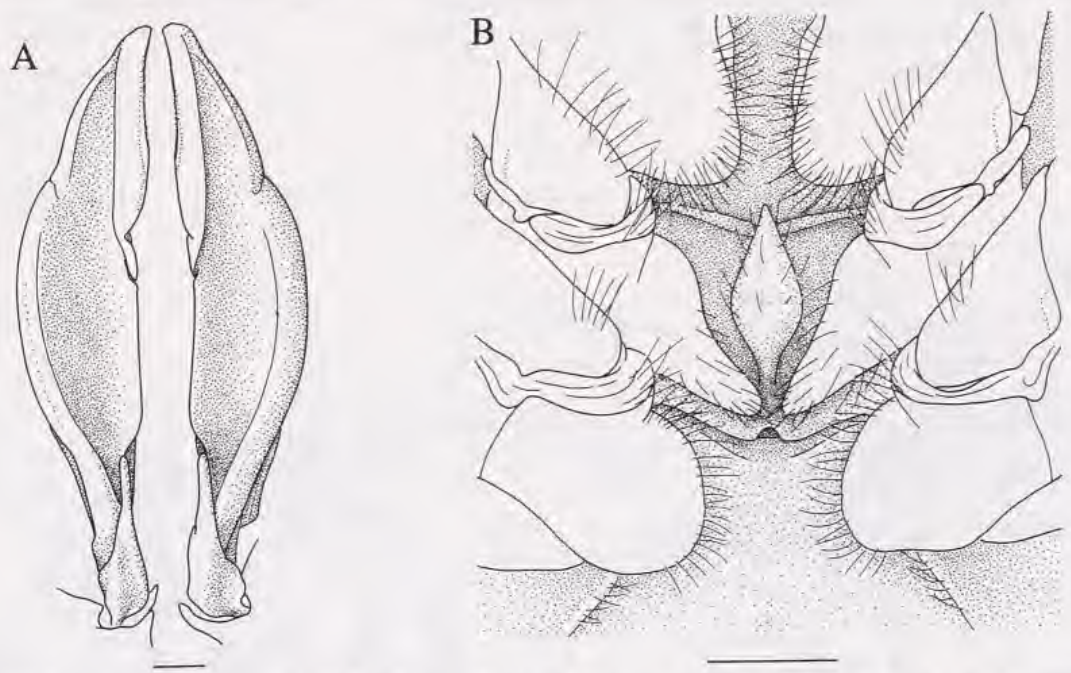


FIG. 29. — *Benthonectes filipes*: **A**, ♂ 19.8 mm cl, North Atlantic Ocean off Virginia, U.S.A. Petasma, dorsal view. — **B**, ♀ 21.5 mm cl, Hudson Canyon, northwest Atlantic Ocean. Thelycum. Scales = 1 mm.

SPECIES. — *Benthonectes filipes* Smith, 1885a. Off North Carolina; off Morocco; Madagascar; Wallis and Futuna Islands; Hawaii.

Genus ***Gennadas*** Bate, 1881

Figures 30-31

Gennadas Bate, 1881, Ann. Mag. nat. Hist., (5)8: 171, 191; 1888, Rep. scient. Results Voy. Challenger, 24: 339. — ALCOCK, 1901, Descr. Cat. Indian Deep-Sea Crust., : 45. — DE MAN, 1911, Siboga Exped., 39a: 15. — KEMP, 1913, Trans. Linn. Soc. Lond., Zool., (2)16: 60. — CALMAN, 1925, Rep. Fish. mar. biol. Surv. Un. S. Afr., 4(3): 3. — BALSS, 1927, Wiss. Ergebn. dt. Tiefsee-Exped. Valdivia, 23(6): 248. — BURKENROAD, 1936b,

Source : MNHN, Paris

Bull. Bingham oceanogr. Coll., 5(2): 59. — ANDERSON and LINDNER, 1943, Trans. Am. Fish. Soc., 73: 291. — BARNARD, 1950, Ann. S. Afr. Mus., 38: 627. — TIRMIZI, 1960, Scient. Rep. John Murray Exped., 10(7): 340. — KENSLEY, 1971b, Ann. S. Afr. Mus., 57(12): 272. — CROSNIER, 1978, Faune Madagascar, 46: 33. — BURKENROAD, 1983, Crust. Issues, 1: 282. — SQUIRES, 1990, Can. Bull. Fish. Aq. Sci., 221: 26. — HAYASHI, 1992, Dendr. Crust. Jap. Waters,: 44.

Placed on the Official List of Generic Names in Zoology, International Commission on Zoological Nomenclature, 1969, Opinion 864, Name No. 1811, Bull. zool. Nom., 25(4/5): 139.

Amalopenaeus Smith, 1882, Bull. Mus. comp. Zool. Harv., 10(1): 86. Type species: By monotypy, *Amalopenaeus elegans* Smith, 1882, Bull. Mus. comp. Zool. Harv., 10(1): 87. Type locality: East coast of United States, South Carolina to New Jersey, 680-2986 m.

Pasiphodes Filhol, 1885b, Vie Fond Mer, pl. 3. Type species: By monotypy, *Pasiphodes purpureus* Filhol, 1885, Vie Fond Mer, pl. 3. Type locality: off Cap Ghir, Morocco, 2210 m. [Dr. L. HOLTHUIS (in litt. 1996) refers to A. MILNE EDWARDS' original color sketch of *Pasiphodes purpureus* in the Paris Museum, probably from the "Talisman" station 38, and suggests that it is *Gennadas valens* (Smith, 1884)].

TYPE SPECIES: By monotypy, *Gennadas parvus* Bate, 1881, Ann. Mag. nat. Hist., (5)8: 192.
TYPE LOCALITY: Off Japan, 26°29'N, 137°57'E, 4437 m.
GENDER: Masculine.

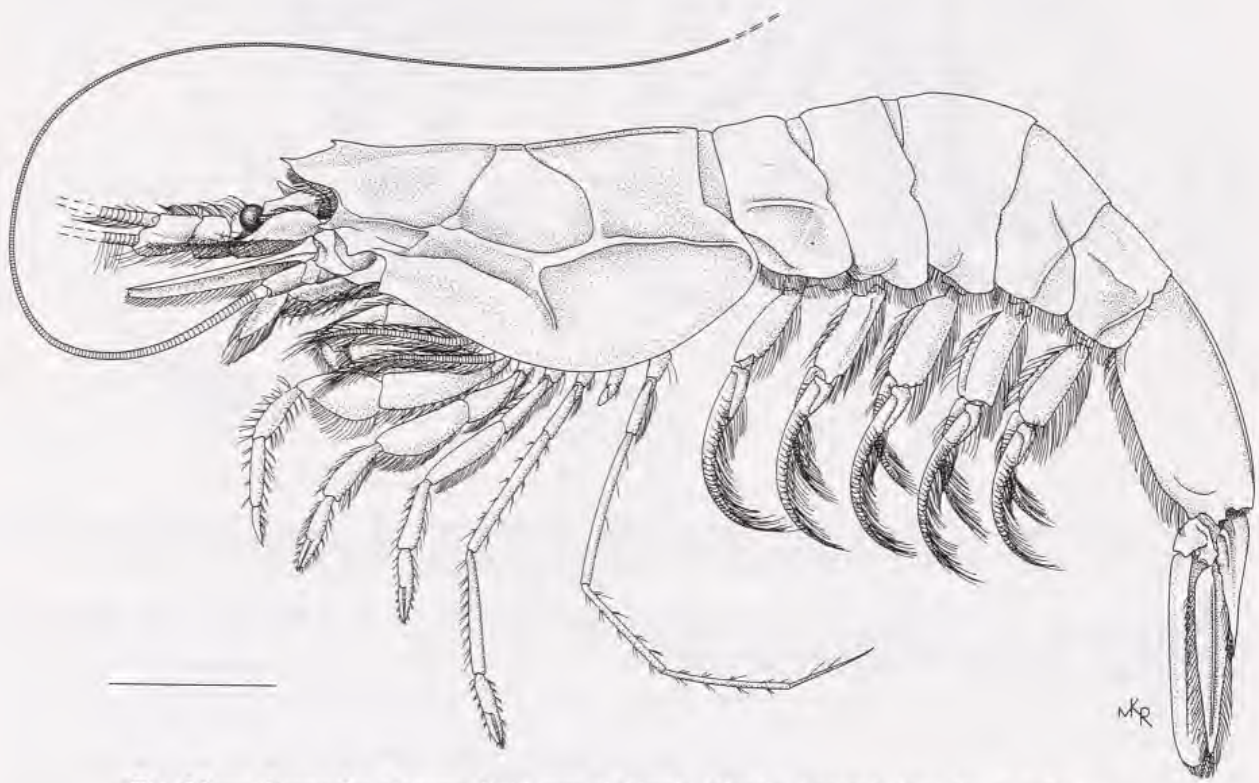


FIG. 30. — *Gennadas elegans*, ♀ 11 mm cl, North Atlantic. Lateral view. Scale = 5 mm.

DIAGNOSIS. — Integument thin, soft. Rostrum short, with single dorsal tooth, not reaching as far as cornea of eye. Carapace with distinct cervical and postcervical sulci reaching dorsal midline; antennal angle narrowly rounded; branchiostegal angle square; weak hepatic and branchiocardiac carinae present. First to fifth abdominal somites dorsally rounded, sixth somite dorsally carinate. Telson apically truncate, with single pair of movable posterolateral spines.

Source : MNHN, Paris

Cornea of eye moderately well pigmented; eyestalk with strong conical mesiodorsal tubercle. Antennular peduncle segments 2 and 3 somewhat expanded. Exopod of first maxilliped lacking distal segmentation. Dactyli of fourth and fifth pereopods slender, uniarticulate. Podobranchia on second maxilliped, lacking on third maxilliped and all pereopods. Arthrobranchia on somite VII rudimentary, two arthrobranchiae from somite VIII to XIII.

Petasma with distal margin divided into external, median, and internal lobes; accessory lobe always present. Appendix masculina bilamellate. Sternites XII-XIV variously modified in female to form thelycum, with small shallow seminal receptacles at base of third pereopods either opening separately, or opening within a common median groove or depression.

Distribution of branchiae, epipods, and exopods in the genus *Gennadas*.

Somite	VII (Mxp1)	VIII (Mxp2)	IX (Mxp3)	X (P1)	XI (P2)	XII (P3)	XIII (P4)	XIV (P5)
Pleurobranchiae	-	-	1	1	1	1	1	1
Arthrobranchiae	r	2	2	2	2	2	2	-
Podobranchiae	-	1	-	-	-	-	-	-
Epipods	1	1	1	1	1	1	1	-
Exopods	1	1	1	-	-	-	-	-

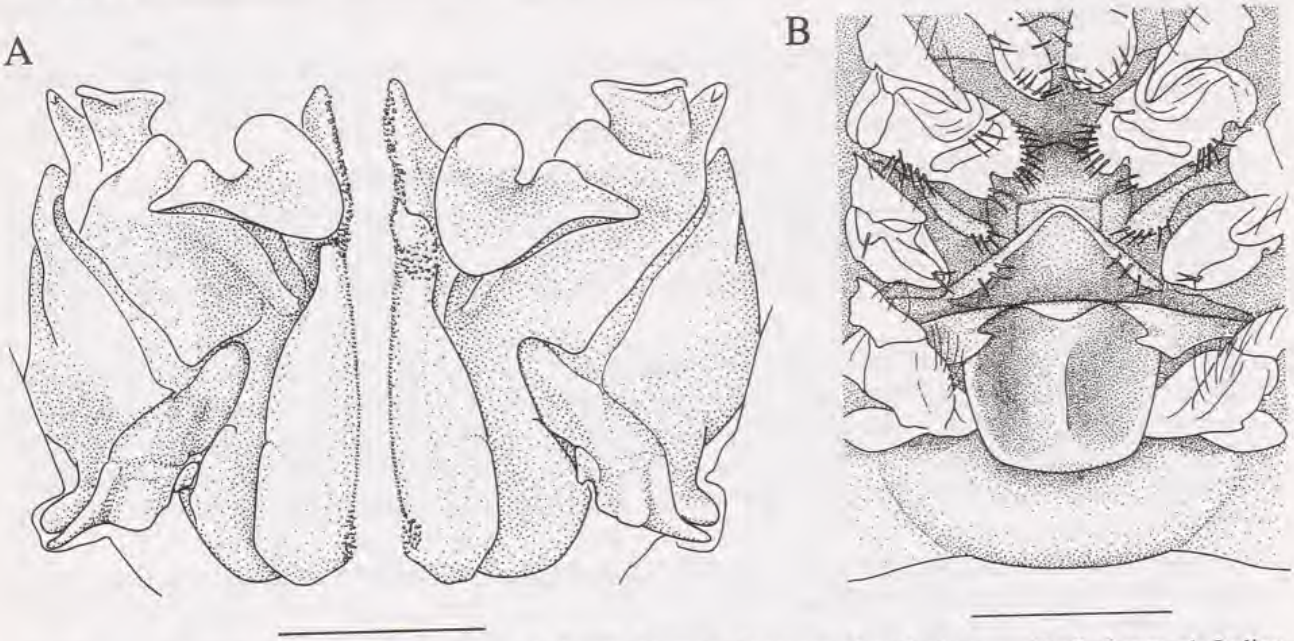


FIG. 31. — *Gennadas parvus*: **A**, ♂ 7 mm cl, South Atlantic. Petasma, dorsal view. — **B**, ♀ 5 mm cl, Indian Ocean. Thelycum. Scales = 1 mm.

SPECIES. — *Gennadas barbari* Vereshchaka, 1990. Naska and Sala-y-Gómez ridges, southeastern Pacific Ocean.

Gennadas bouvieri Kemp, 1909. Off Baja California; Gulf of Mexico; Bahamas; Caribbean; Bermuda; south-east Atlantic Ocean; south-west Indian Ocean; Zanzibar; Gulf of Aden; Madagascar; Maldive Islands; Gulf of Arabia; Bay of Bengal; Indonesia; Philippines; Japan; east coast of Australia; north-west Pacific Ocean.

Source : MNHN, Paris

Gennadas brevirostris Bouvier, 1905b. Caribbean; southern Spain; Eastern Atlantic Ocean from Sierra Leone to South Africa.

Gennadas capensis Calman, 1925. Off Baja California; Gulf of Mexico; Bahamas; Caribbean Sea; Bermuda; Canary Islands; off Mauritania; south-east Atlantic Ocean; south-west Indian Ocean; Madagascar; east coast of Australia; Wallis and Futuna Islands; north-west Pacific Ocean.

Gennadas clavicarpus De Man, 1907. South-east Atlantic Ocean off Cape of Good Hope, South Africa; south-west Indian Ocean; Zanzibar; Gulf of Aden; Réunion; central Indian Ocean; Indonesia.

Gennadas crassus Tirmizi, 1960. Zanzibar.

Gennadas elegans (Smith, 1882). Western north Atlantic Ocean from New York to Florida; Bahamas; Bermuda; Cape Verde Islands; Mediterranean; North Atlantic Ocean off Morocco; off Gabon; south-east Atlantic Ocean.

Gennadas gilchristi Calman, 1925. South-east Atlantic Ocean; south-west Indian Ocean; east coast of Australia.

Gennadas incertus (Balss, 1927). North-east Pacific Ocean off Oregon and Baja California; South-east Atlantic Ocean; south-west Indian Ocean; east African coast off Kenya and Tanzania; Zanzibar; Madagascar; Seychelles; Gulf of Arabia; east coast of Australia; Japan; north-west Pacific Ocean.

Gennadas kempi Stebbing, 1914. South-east Atlantic Ocean; south-west Indian Ocean; east coast of Australia.

Gennadas parvus Bate, 1881. North-east Pacific Ocean; south-east Atlantic Ocean off Cape of Good Hope, South Africa; south-west Indian Ocean; Zanzibar; Gulf of Aden; Madagascar; Arabian Sea; Japan; Hawaii; north-west Pacific Ocean.

Gennadas pectinatus Schmitt, 1921. Off Santa Catalina Island, California.

Gennadas propinquus Rathbun, 1906. North-east Pacific Ocean off Oregon and Baja California; South-east Atlantic Ocean; south-west Indian Ocean; Gulf of Aden; Madagascar; Arabian Sea; Philippines; east coast of Australia; Wallis and Futuna Islands; north-west Pacific Ocean.

Gennadas scutatus Bouvier, 1906a. Off Baja California; Isla Clarion, off Mexico, and Isla Lobos de Terra, northern Peru; Gulf of Mexico; Bahamas; Caribbean Sea; north-east Atlantic Ocean off Azores; Cape Verde Islands; Gabon; Congo; Angola; south-east Atlantic Ocean off Cape of Good Hope; south-west Indian Ocean off Natal; Gulf of Aden; Madagascar; Seychelles; Indonesia; east coast of Australia; Indo-Pacific Ocean from east coast of Africa to west coast of America.

Gennadas sordidus Kemp, 1910a. Off Baja California; Gulf of California and southern Mexico; Gulf of Aden; Gulf of Oman; Arabian Sea.

Gennadas talismani Bouvier, 1906a. Gulf of Mexico; eastern Atlantic Ocean from Cape Verde Islands to Cape of Good Hope.

Gennadas tinayrei Bouvier, 1906a. Off Baja California; north-west Atlantic Ocean; Bahamas; Bermuda; Azores; Gibraltar; south-east Atlantic Ocean off St. Helena Island and Cape of Good Hope; south-west Indian Ocean; Zanzibar; Madagascar; Seychelles; Maldive Islands; Japan; east coast of Australia; north-west Pacific Ocean.

Gennadas valens (Smith, 1884). Gulf of Mexico; Caribbean; Bahamas; Bermuda; Canary Islands; Mediterranean; eastern Atlantic Ocean from Ireland to Cape of Good Hope, South Africa.

Source : MNHN, Paris

Family PENAEIDAE Rafinesque-Schmaltz, 1815

Penedia Rafinesque-Schmaltz, 1815, Anal. Nat. Tabl. Univers, : 98 [subfamily of the Plyonuria].

Penaeidae - Dana, 1852a, Proc. Acad. nat. Sci. Philad., 6: 18; 1852b, Am. J. Sci. Arts, (2)14: 123; 1853, Class. Geog. Distrib. Crust., : 1434. — Boas, 1880, Vidensk. Selsk. Skr., (6)1: 155. — Bate, 1881, Ann. Mag. nat. Hist., (5)8: 171, 173; 1888, Rep. scient. Results Voy. Challenger, 24: 220. — Ortmann, 1898, Bronn's Kl. Ordn. Tierreichs, (5)2: 1118. — Alcock, 1901, Descr. Cat. Indian Deep-Sea Crust., : 11. — Bouvier, 1908a, Résult. Camp. scient. Prince Albert I, 33: 9. — De Man, 1911, Siboga Exped., 39a: 1. — Barnard, 1950, Ann. S. Afr. Mus., 38: 580. — Balss, 1957, Bronn's Kl. Ordn. Tierreichs, 5(1)7(12): 1516. — Pérez Farfante, 1978, FAO Sp. Ident. Sh., 6: 1. — Williams, 1984, Shr. Lob. Crabs Atl. Coast U.S., : 22. — De Freitas, 1987, Investl. Rep. oceanogr. Res. Inst., Durban, 58: 1. — Pérez Farfante, 1988, NOAA Tech. Rep. NMFS, 64: iii, 8. — Dall *et al.*, 1990, Adv. Mar. Biol., 27: 59, 60.
Placed on the Official List of Family Group Names in Zoology, International Commission on Zoological Nomenclature, 1955, Direction 15, Op. Decl. Int. Comm. zool. Nom., 1C(C5): 70.

Penaeinae - Ortmann, 1898, Bronn's Kl. Ordn. Tierreichs, 5(2): 1120. — Bouvier, 1908a, Résult. Camp. scient. Prince Albert I, 33: 6. — Burkenroad, 1934b, Bull. Am. Mus. Nat. Hist., 68(2): 72. — Balss, 1957, Bronn's Kl. Ordn. Tierreichs, 5(1)7(12): 1517.

Parapenaeinae Ortmann, 1898, Bronn's Kl. Ordn. Tierreichs, (5)2: 1120.
Placed on the Official List of Family-Group Names in Zoology, International Commission on Zoological Nomenclature, 1961, Opinion 611, Bull. zool. Nom., 18(5): 307.

Funchaliae Bouvier, 1908a, Résult. Camp. scient. Prince Albert I, 33: 6. — Balss, 1957, Bronn's Kl. Ordn. Tierreichs, 5(1)7(12): 1518.

Haliporae Bouvier, 1908a, Résult. Camp. scient. Prince Albert I, 33: 6. — Balss, 1957, Bronn's Kl. Ordn. Tierreichs, 5(1)7(12): 1518.

Funchaliinae - Burukovsky and Romensky, 1991, Biull. Mosk. O-va Ispyt Prirod. Otd. Biol., 96(6): 61.

Diagnosis. — Body compressed, comparatively slender. Rostrum well developed, extending to or beyond distal margin of eye; armed with dorsal and sometimes also with ventral teeth. Carapace without postorbital spine; antennal and hepatic spines usually present; cervical sulcus ending well ventral to dorsal midline. Posterior abdominal somites carinate. Telson sharply pointed, with or without lateral spines.

Eye with optic calathus almost always lacking mesial tubercle; basal article of eyestalk produced into moderately to slightly developed, never freely projecting, distomesial scale; ocular plate lacking styliform projection. Antennule with foliaceous prosartema, flagella of about same length, borne on apex of third segment. Exopod present on second maxilliped (except in *Artemesia, Macropetasma*, and *Protrachypene*) and third maxilliped (absent only in *Macropetasma*), and first four pereopods. Third through fifth pleopods biramous. Pleurobranchia on somites IX through XII, and sometimes on XIII and XIV; rudimentary arthrobranchia usually present on somite VII, two arthrobranchiae on VIII through XII, and posterodorsal one on XIII (sometimes rudimentary anteroventral one also present on XIII); podobranchia on second maxilliped only. Epipods borne on first maxilliped and usually on second, lacking on fourth and fifth pereopods.

Petasma semi-open or semi-closed. Second pleopod of males bearing appendix masculina only, lacking appendix interna and distolateral projection. Thelycum open or closed.

Key to the Genera of the Family PENAEIDAE

1. Rostrum armed with dorsal and usually also ventral teeth (absent only in *Funchalia*). Pleurobranchia on somite XIV (last thoracic somite) **2**
— Rostrum usually armed with dorsal teeth only. No pleurobranchia on somite XIV **10**

Source : MNHN, Paris

2. Integument glabrous and polished. Three short, well defined cicatrices on sixth abdominal somite **3**
— Integument setose. Single, long (sometimes interrupted) cicatrix on sixth abdominal somite or none **8**

3. Adrostral sulcus and carina short, falling distinctly short or extending to about level of epigastric tooth. Gastrofrontal carina absent **4**
— Adrostral sulcus and carina long, reaching much beyond epigastric tooth, usually almost to posterior margin of carapace. Gastrofrontal carina present **6**

4. Hepatic carina absent or, if present, moderately to ill defined ..... ***Fenneropenaeus***
— Hepatic carina prominent **5**

5. Thelycum open. Petasma with ventral costa short, not reaching distal margin of lateral lobe ..... ***Litopenaeus***
— Thelycum closed. Petasma with ventral costa long, reaching distal margin of lateral lobe ..... ***Penaeus*** s.s.

6. Gastrofrontal carina not turning anterodorsally upon itself at posterior end. Sixth abdominal somite with well defined dorsolateral sulcus. Telson unarmed ..... ***Farfantepenaeus***
— Gastrofrontal carina turning anterodorsally upon itself at posterior end. Sixth abdominal somite lacking dorsolateral sulcus. Telson usually armed with three pairs of movable lateral spines (absent only in *Melicertus canaliculatus*) **7**

7. Gastrofrontal sulcus not markedly bifid posteriorly. Thelycum with pair of lateral plates on sternite XIV shielding saclike seminal receptacle opening along midline ..... ***Melicertus***
— Gastrofrontal sulcus markedly bifid posteriorly. Thelycum with single plate on sternite XIV infolded laterally, forming pouch opening anteriorly, functioning as seminal receptacle ..... ***Marsupenaeus***

8. Integument with numerous sulci overlapped by rows of densely set stiff setae projecting from one margin. Telson with four pairs of movable lateral spines. Antennular flagella short, less than half length of carapace ..... ***Heteropenaeus***
— Integument with few sulci not overlapped by rows of stiff setae. Telson with three pair of fixed lateral spines. Antennular flagella long, longer than carapace **9**

9. Rostrum armed with dorsal teeth only. Carapace lacking dorsolateral carina. Incisor processes of mandible extremely elongate, scythelike and crossing posterior to labrum. Petasma asymmetrical with either right or left half longer than opposite ..... ***Funchalia***
— Rostrum armed with dorsal and ventral teeth. Carapace with dorsolateral carina. Incisor processes of mandible short, not crossing. Petasma symmetrical, both halves of same length ..... ***Pelagopenaeus***

Source : MNHN, Paris

10. Telson with pair of well developed fixed subapical spines (preceded by lateral movable spines). First segment of antennular peduncle usually bearing ventromesial (parapenaeid) spine **11**
— Telson without pair of subapical fixed spines (only occassionally present as in *Parapenaeopsis stylifera* and *Rimapenaeus fuscina*), usually with movable lateral spines. First segment of antennular peduncle lacking parapenaeid spine **14**

11. Carapace with longitudinal suture (extending at least 0.8 of its length) and transverse suture. Not more than one pair of minute lateral spines anterior to subapical spines ..... ***Parapenaeus***
— Carapace without longitudinal suture. Two or more pairs of conspicuous spines anterior to subapical spines **12**

12. Pterygostomian spine absent (anteroventral margin of carapace rounded). First pereopod without basial spine. Exopods lacking on second maxillipeds and all pereopods ..... ***Artemesia***
— Pterygostomian spine present (anteroventral margin of carapace toothlike). First pereopod with basial spine. Exopods on all maxillipeds and pereopods **13**

13. Third maxilliped and second pereopod with basial spine. Petasma asymmetrical ..... ***Metapenaeopsis***
— Third maxilliped and second pereopod without basial spine. Petasma symmetrical ..... ***Penaeopsis***

14. Pleurobranchia on somite XIII (penultimate thoracic somite). Exopods on maxillipeds and four anterior pairs of pereopods, lacking on fifth pereopod ..... ***Metapenaeus***
— Pleurobranchia absent on somite XIII. Exopods present on all pereopods or absent from four posterior pairs **15**

15. Exopods on first maxilliped and first pereopod. Petasma with lateral lobes distally produced into extremely long, filamentous processes. Thelycum with lateral plates curved posteriorly and expanded into bulbous swelling anteriorly ..... ***Macropetasma***
— Exopods at least on third maxilliped and all pereopods. Petasma with lateral lobes not distally produced into extremely long filamentous processes. Thelycum with lateral plates neither strongly curved posteriorly nor expanded into bulbous swelling anteriorly **16**

16. Carapace lacking longitudinal and transverse sutures. Telson with subapical pair of lateral movable spines mounted on elongate shoulder. Epipods not furcate. Petasma with ventrolateral lobule produced into two or three distal flaps ..... ***Trachypenaeopsis***
— Carapace with either longitudinal or transverse sutures or both, absent only in *Miyadiella*. Telson lacking spines or with movable ones not mounted on shoulders or mounted on slight ones. Petasma with ventrolateral lobule not produced into distal flaps **17**

17. Second maxilliped without exopod. First three pereopods with elongate chela, propod lengthened and dactyl very short (much less than half length of propod) ..... ***Protrachypene***

Source : MNHN, Paris

— Second maxilliped with well developed exopod. First three pereopods with not elongate chela, propod not lengthened and dactyl not less than half length of propod **18**

18. Fourth and fifth pereopods very elongate, subflagelliform, much longer than first three **19**
— Fourth and fifth pereopods not elongate, only slightly longer than first three, or only fifth elongate **20**

19. Integument pubescent. Telson armed with four pairs of movable spines. Fourth and fifth pereopods with entire dactyl ..... ***Tanypenaeus***
— Integument glabrous. Telson unarmed. Fourth and fifth pereopods with multiarticulate dactyl ..... ***Xiphopenaeus***

20. Carapace lacking longitudinal sutures. Second pereopod armed with ischial spine **21**
— Carapace with longitudinal sutures. Second pereopod lacking ischial spine. **22**

21. Eyestalk not surpassing first antennular segment. Basal rostral teeth and postrostral carina lacking spinules. Thelycum closed ..... ***Atypopenaeus***
— Eyestalk conspicuously surpassing first antennular segment, sometimes reaching or overreaching antennular peduncle. Basal rostral teeth and postrostral carina studded with spinules. Thelycum open ..... ***Miyadiella***

22. Body slender, integument thin. Third pereopod lacking epipod .... ***Parapenaeopsis***
— Body thickset, integument thick. Third pereopod armed with epipod **23**

23. Carapace with longitudinal suture long, conspicuously overreaching hepatic spine. Third maxilliped armed with basial spine ..... ***Rimapenaeus***
— Carapace with longitudinal suture short, ending well anterior to hepatic spine. Third maxilliped lacking basial spine **24**

24. Thelycum with plate on sternite XIV very short medially, deeply excavate, embracing extremely long caudal extension of median protuberance. Petasma with distolateral projections either moderately broad to rather narrow basally and extending laterally to mesially or forward directed hooklike tip or extremely broad basally but narrowing rapidly, ending inforward directed tip ..... ***Megokris***
— Thelycum with plate on sternite XIV relatively long, not excavate, median protuberance lacking long caudal extension. Petasma with distolateral projections either relatively narrow and directed laterally almost straight or curving backwards, or extremely broad and ending in long, twisted process **25**

25. Thelycum with plate on sternite XIV not emarginate anteriorly, instead continuous with median protuberance, lacking anterior transverse groove. Petasma with distolateral projections extremely broad, extending laterally and forming apically long, flat twisted process ..... ***Trachypenaeus***
— Thelycum with plate on sternite XIV shallowly emarginate or occasionally produced in small median prominence, not continuous with median protuberance. Petasma with distolateral projections tapering gently from relatively narrow base, extending almost straight laterally or curving slightly backwards ..... ***Trachysalambria***

Source : MNHN, Paris

Genus *Artemesia* Bate, 1888

Figures 32-34

Artemesia Bate, 1888, Rep. scient. Results Voy. Challenger, 24: 280. — Bouvier, 1908b, Bull. Inst. Oceanogr., 119: 4. — Burkenroad, 1934a, Bull. Bingham oceanogr. Coll., 4(7): 11; 1934b, Bull. Am. Mus. nat. Hist., 68(2): 73; 1983, Crust. Issues, 1: 282. — Dall *et al.*, 1990, Adv. Mar. Biol., 27: 63.

Placed on the Official List of Generic Names in Zoology, International Commission on Zoological Nomenclature, 1969, Opinion 864, Name No. 1806, Bull. zool. Nom., 25(4/5): 138.

Artemisia - Mistakidis & Neiva, 1964, Nature, Lond., 202: 471. — Starobogatov, 1972, Akad. Nauk., USSR., Zool. Inst. Issled. Fauny Morei, 10(18): 385.

Type Species: By monotypy, *Artemesia longinaris* Bate, 1888, Rep. scient. Results Voy. Challenger, 24: 281.

Type Locality: Off Montevideo, Uruguay, 35°02'S, 55°15'W, 24 m.

Gender: Feminine.

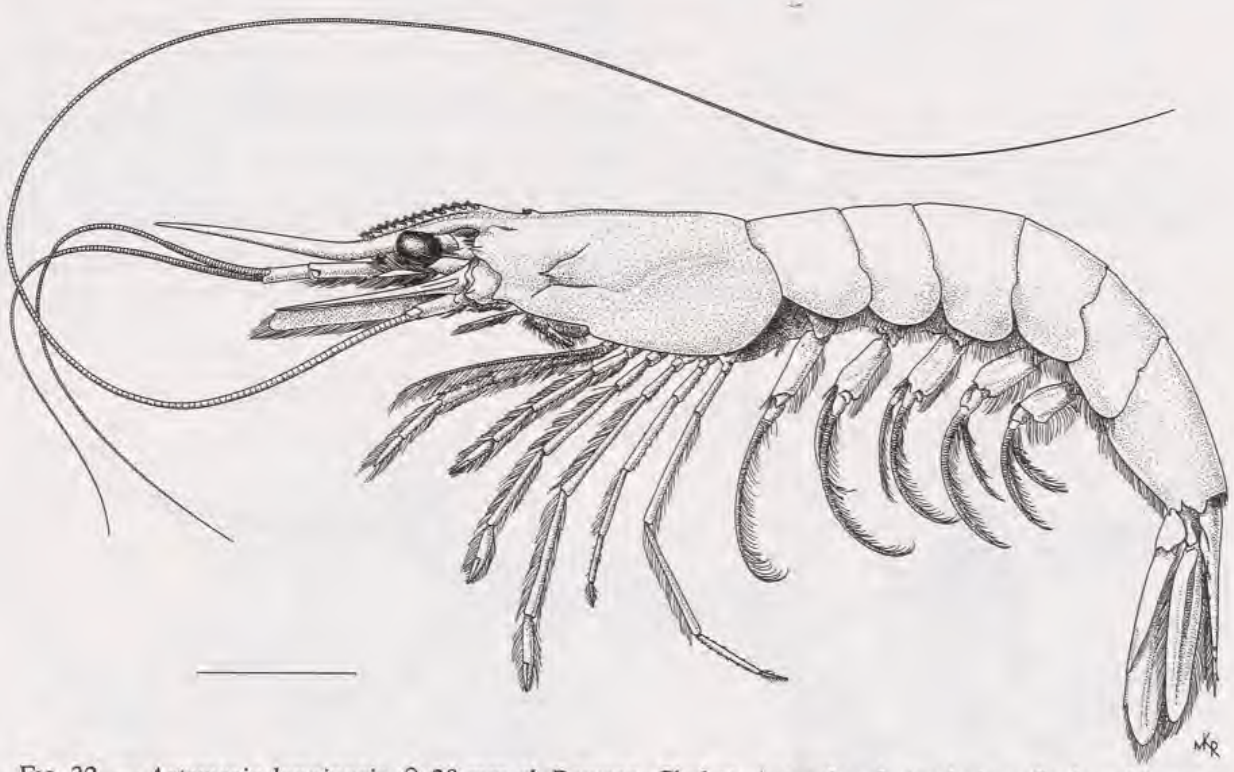


Fig. 32. — *Artemesia longinaris*, ♀ 28 mm cl, Rawson, Chubut, Argentina. Lateral view. Scale = 10 mm.

Diagnosis. — Integument glabrous. Rostrum bearing dorsal teeth only, limited to base, long, slender, considerably overreaching antennular peduncle; epigastric tooth usually distinctly separated from first rostral tooth, occasionally close to latter. Carapace with antennal and hepatic spines, lacking orbital, pterygostomian (although angle produced) and branchiostegal spines; postrostral carina extending to about two-thirds length of carapace; postocular sulcus present; cervical sulcus short; hepatic sulcus well marked, accompanied by sharp carina anteriorly; branchiocardiac carina clearly distinct, but not prominent; longitudinal and transverse sutures absent. Sixth abdominal somite lacking cicatrices. Telson armed with pair of fixed posterolateral spines and two or three pairs of more anterior movable spines.

Source : MNHN, Paris

FIG. 33. — *Artemesia longinaris*, ♂ 25 mm cl, Rawson, Chubut, Argentina. Petasma, dorsal view. Scale = 1 mm.

Antennule bearing parapenaeid spine; antennular flagella subfiliform, longer than carapace. Palp of first maxilla short, entire, gently tapering to rounded apex and bearing large proximomesial lobe and lacking mesial spine. Basial and ischial spines lacking on first and second pereopods; fourth and fifth pereopods subfiliform. Exopods lacking on pereopods; rudimentary anteroventral filamentous arthrobranchia on somite XIII.

Petasma symmetrical, semiclosed, with distal part of dorsolateral lobules produced in strong spoutlike shallow channelled distal projections and bearing long, slender distodorsal horns mesially. Appendix masculina greatly expanded from narrow base. Thelycum closed, with single heavily sculptured plate on sternite XIV and strongly developed median protuberance on sternite XIII. Seminal receptacles consisting of paired pyriform sacs bearing distally two minute lobules and connected distomesially by narrow transverse troughlike duct situated on distal margin of sternite XIV; opening of duct continuous with slits extending along distal extremity of sacs; slits, in turn, opening into cavity at base of fourth pereopod. Apparently, sperm enters into the duct, flows to the sacs, and exits through the slits.

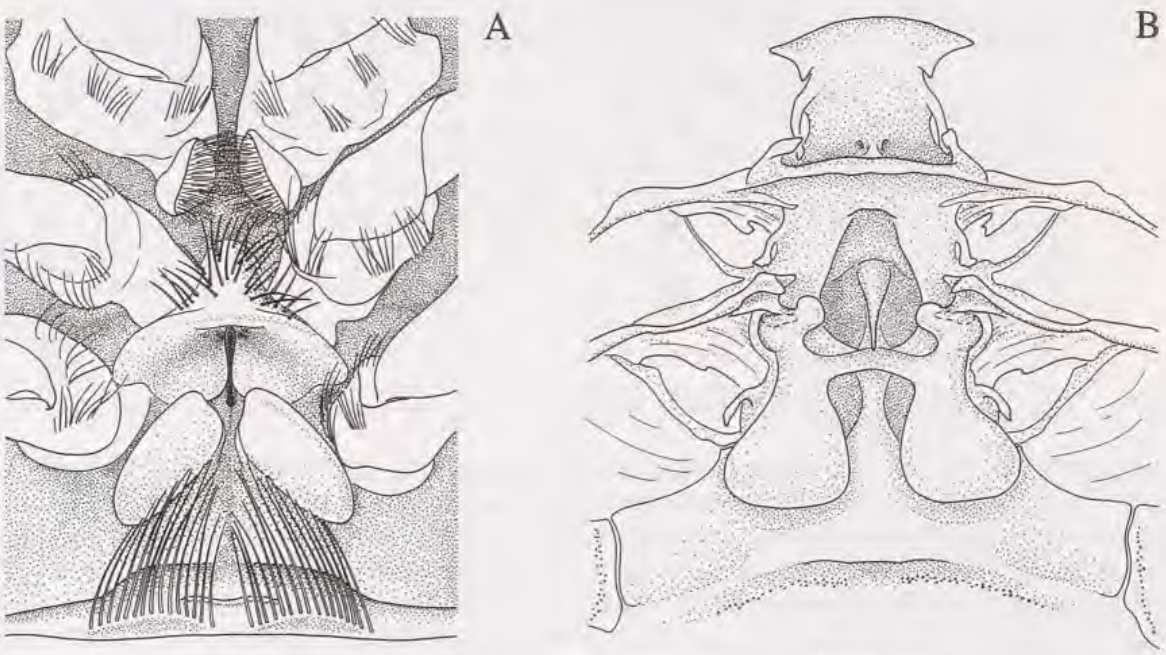


FIG. 34. — *Artemesia longinaris*, ♀ 28 mm cl, Rawson, Chubut, Argentina: **A**, Thelycum. Scale = 1 mm. — **B**, ♀ 18 mm cl, off mouth of Rio de la Plata, Argentina. Seminal receptacles, dorsal view. Scale = 1 mm.

Source : MNHN, Paris

Distribution of branchiae, epipods, and exopods in the genus *Artemesia*

Somite	VII (Mxp1)	VIII (Mxp2)	IX (Mxp3)	X (P1)	XI (P2)	XII (P3)	XIII (P4)	XIV (P5)
Pleurobranchiae	-	-	1	1	1	1	1	-
Arthrobranchiae	r	2	2	2	2	2	r+1	-
Podobranchiae	-	1	-	-	-	-	-	-
Epipods	1	1	-	1	1	1	-	-
Exopods	1	-	1	-	-	-	-	-

SPECIES. — *Artemesia longinaris* Bate, 1888. Rio de Janeiro, Brazil to Chubut, Argentina.

Genus ***Atypopenaeus*** Alcock, 1905

Figures 35-38

Penaeus - STIMPSON, 1860, Proc. Acad. nat. Sci. Philad., 12: 43. — HENDERSON, 1893, Trans. Linn. Soc. Lond., (2), Zool., 5: 450.

Atypopeneus Alcock, 1905, Ann. Mag. nat. Hist., (7)16: 524; 1906, Cat. Indian Dec. Crust., 3(1): 45. — BURKENROAD, 1934a, Bull. Bingham oceanogr. Coll., 4(7): 41; 1934b, Bull. Am. Mus. Nat. Hist., 68(2): 95; 1983, Crust. Issues, 1: 283, 287.

Parapenaeopsis - KUBO, 1936, J. imp. Fish. Inst., Tokyo, 31(2): 55.

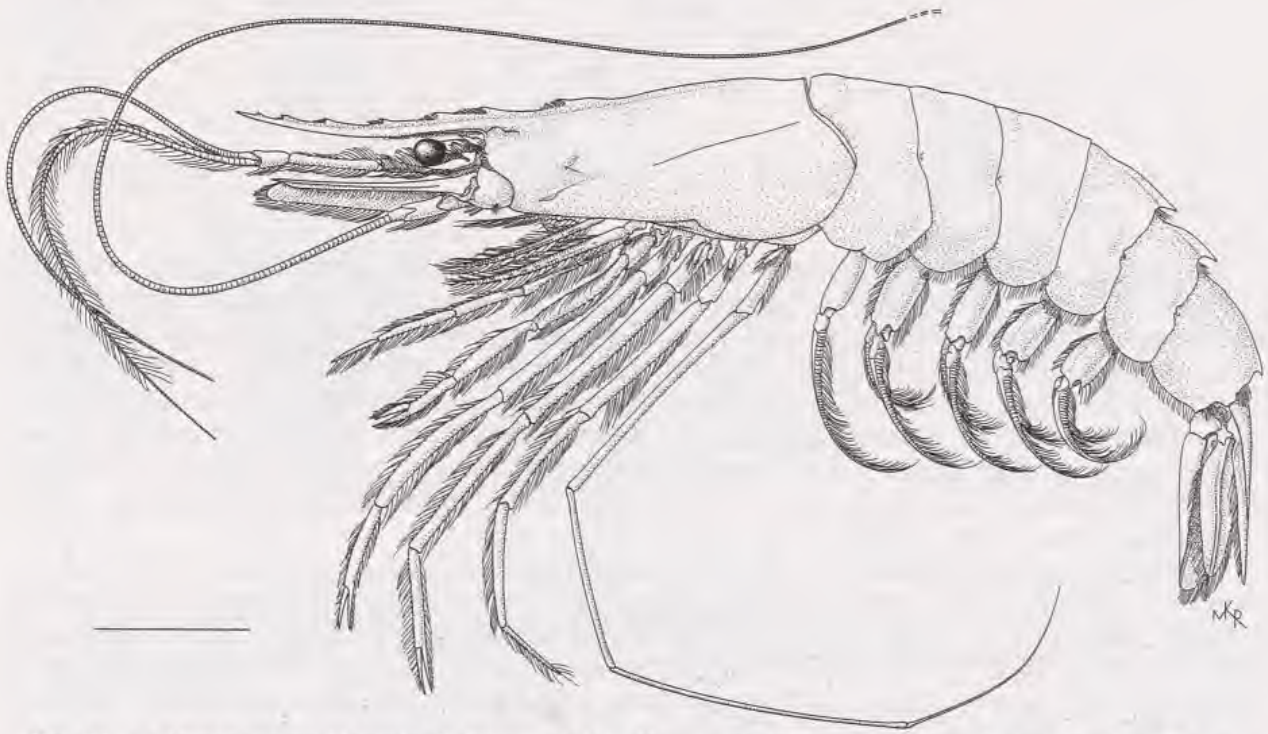


FIG. 35. — *Atypopenaeus bicornis*, ♀ 20 mm cl, Van Diemen Gulf, Australia. Lateral view. Scale = 10 mm.

Source : MNHN, Paris

Atypopenaeus [emendment of *Atypopeneus* Alcock, 1905, under the plenary powers by the International Commission on Zoological Nomenclature, 1969]. Placed on the Official List of Generic Names in Zoology, International Commission on Zoological Nomenclature 1969, Opinion 864, Name No. 1807, Bull. zool. Nom., 25(4/5): 138. — De Man, 1911, Siboga Exped., 39a: 83. — Kubo, 1949, J. Tokyo Coll. Fish., 36(1): 365. — Dall, 1957, Aust. J. mar. Freshwat. Res., 8(2): 198. — Racek and Dall, 1965, Verh. K. Ned. Akad. Wet. Nat., 56(3): 84. — Starobogatov, 1972, Akad. Nauk SSSR Zool. Inst. Isled, Fauney Moreii, 10(18): 369, 386. — Holthuis, 1980b, FAO Fish. Synop., 125, 1: 13. — Dall *et al.*, 1990, Adv. Mar. Biol., 27: 64. — Hayashi, 1992, Dendr. Crust. Jap. Waters, : 70.

Type Species: By original designation, *Penaeus compressipes* Henderson, 1893, Trans. Linn. Soc. Lond., (2), Zool. 5: 450.

Type Locality: Gulf of Martaban, India.

Gender: Masculine.

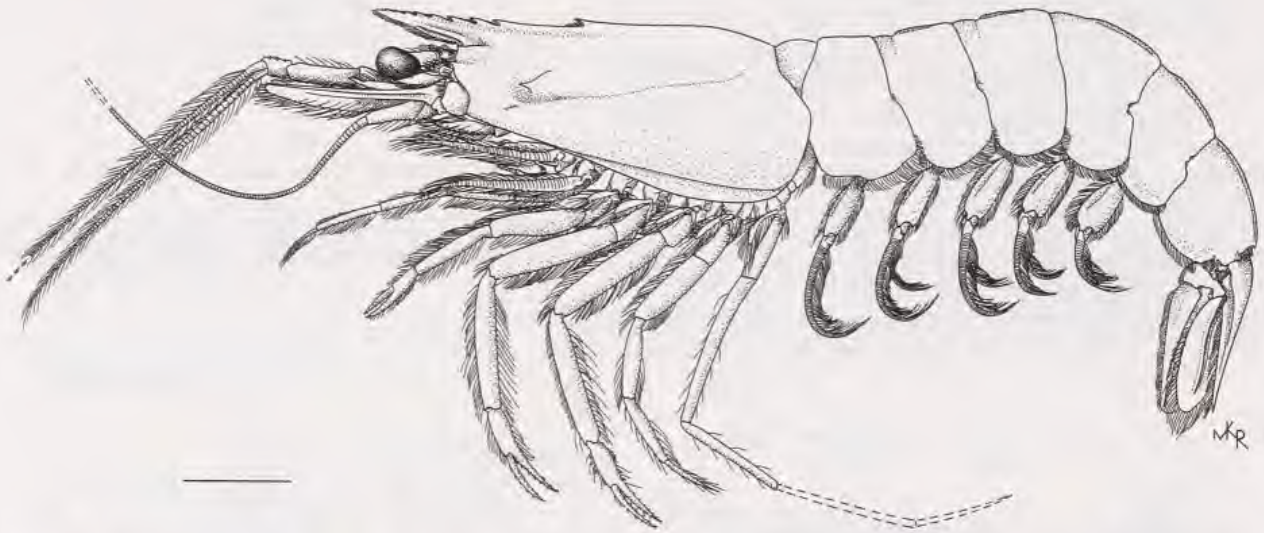


Fig. 36. — *Atypopenaeus stenodactylus*, ♀ 14 mm cl, southwest of Hainan Island, China. Lateral view. Scale = 5 mm.

Diagnosis. — Integument glabrous, sparsely and microscopically setose, or sometimes partly granulate. Rostrum armed with dorsal teeth only, variable in length; epigastric tooth usually widely separated from first rostral tooth. Carapace with minute, occasionally absent orbital and small non-buttressed antennal spines; hepatic spine present or absent; lacking pterygostomian spine; postocular sulcus well defined; antennal carina and orbito-antennal sulcus absent; cervical sulcus usually short; hepatic sulcus feeble or absent, hepatic carina marked anterior to hepatic spine; branchiocardiac sulcus feeble; longitudinal suture lacking, transverse suture marked (in *A. compressipes, A. dearmatus* and *A. stenodactylus*) or indistinct. Sixth abdominal somite lacking cicatrices. Telson unarmed.

Antennule lacking parapenaeid spine; antennular flagella as long as or longer than antennular peduncle, sometimes longer than carapace. Palp of first maxilla short, biarticulate, distal article minute, much larger basal article bearing weak proximolateral lobule and conspicuous proximomesial and smaller distomesial lobules, latter armed with spine; also distolateral row of spinules. Fifth pereopod slender and very elongate, much longer than preceding ones, extending at least by dactyl beyond antennal scale and as far as tip of antennular flagella. Basial spine

Source : MNHN, Paris

lacking on first, present on second and third pereopods, ischial spine on first and second. Minute ridge present in place of anteroventral arthrobranchia on somite XIII.

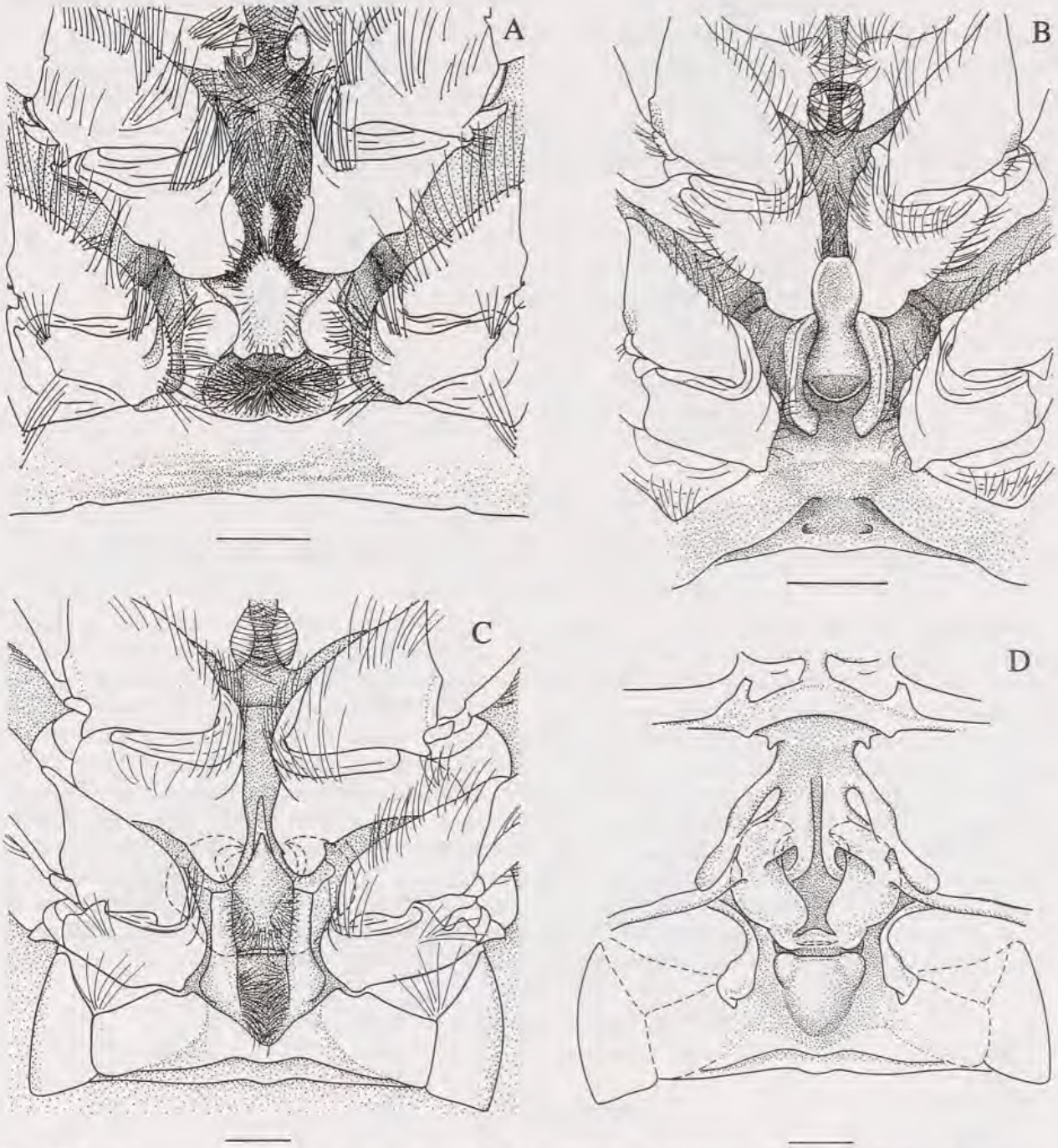


FIG. 37 A. — *Atypopenaeus bicornis*, ♀ 20 mm cl, Van Diemen Gulf, Australia. Thelycum. Scale = 1 mm.
FIG. 37 B. — *Atypopenaeus stenodactylus*, ♀ 15 mm cl, southwest of Hainan Island, China. Thelycum. Scale = 10 mm.
FIG. 37 C-D. — *Atypopenaeus formosus*, ♀ 22 mm cl, Van Diemen Gulf, Australia. **C**, Thelycum and outline of ventral view of seminal receptacles. **D**, Seminal receptacles, dorsal view. Scales = 1 mm.

Source : MNHN, Paris

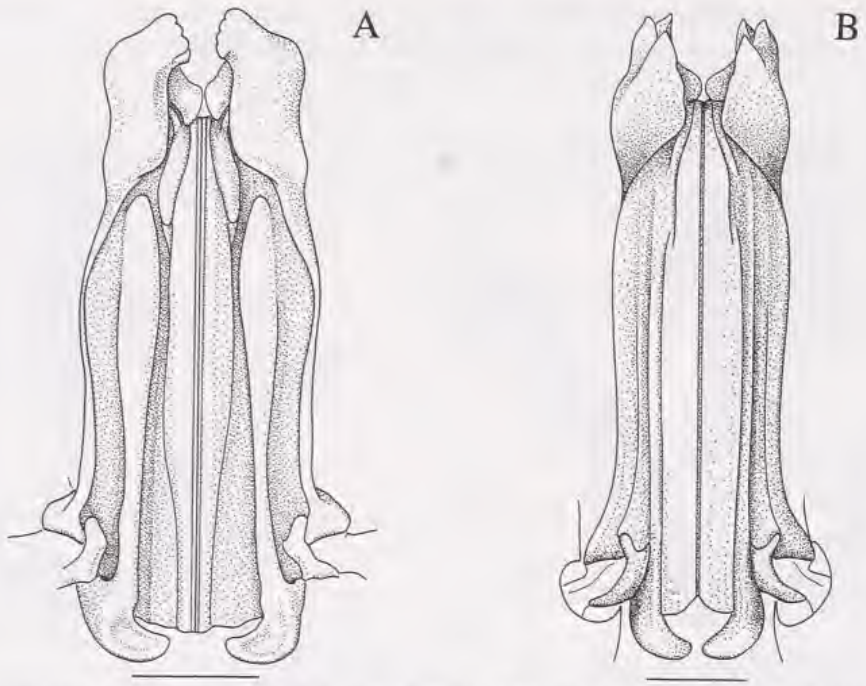


FIG. 38 A. — *Atypopenaeus bicornis*, ♂ 14 mm cl, Van Diemen Gulf, Australia. Petasma, dorsal view. Scale = 1 mm.

FIG. 38 B. — *Atypopenaeus stenodactylus*, ♂ 9 mm cl, southwest of Hainan Island, China. Petasma, dorsal view. Scale = 0.5 mm.

Petasma symmetrical, semiclosed, subcylindrical, with lateral lobes variable in shape, produced distally into elongate forwardly directed, acute or blunt projections, or ovoid, or with minute laterally directed hornlike projections. Appendix masculina small, jointed to strong dorsomesial rib of endopod. Thelycum closed, with paired, distinctly separated, long, flaplike lateral plates often flanking posteriorly deep concavity on sternite XIV; median protuberance on sternite XIII elongate (but falling conspicuously short of posterior thoracic ridge of sternite XIV), roughly hourglass in shape, or acute anteriorly. Seminal receptacles consisting of paired proximally rigid, distally membranous curved sacs continuous basally through sternal invagination, between sternites XIV and XIII, forming transverse groove opening by horizontal slit; sacs extending anteriorly into sternite XIII and opening through paired slits lying dorsal to anterolateral part of median protuberance, above base of fourth pereopods. These receptacles, as those in members of *Metapenaeus*, are unusual in that they are proximally rigid, instead of entirely membranous, and extend anteriorly rather than posteriorly, from sternite XIV.

Distribution of branchiae, epipods, and exopods in the genus *Atypopenaeus*.

Somite	VII (Mxp1)	VIII (Mxp2)	IX (Mxp3)	X (P1)	XI (P2)	XII (P3)	XIII (P4)	XIV (P5)
Pleurobranchiae	-	-	1	1	1	1	-	-
Arthrobranchiae	r	2	2	2	2	2	1	-
Podobranchiae	-	1	-	-	-	-	-	-
Epipods	1	1	-	1	1	1	-	-
Exopods	1	1	1	1	1	1	1	1

Source : MNHN, Paris

SPECIES. — *Atypopenaeus bicornis* Racek and Dall, 1965. New Guinea; Northern Territory, Australia.

Atypopenaeus compressipes (Henderson, 1893). India to Malaysia; Indonesia; Hong Kong; Philippines; Japan; New Guinea; Northern Territory, Australia.

Atypopenaeus dearmatus De Man, 1907. Indonesia; Philippines; Van Diemen Gulf, Australia.

Atypopenaeus formosus Dall, 1957. New Guinea; Northern Territory, Queensland, northern New South Wales, Australia.

Atypopenaeus stenodactylus (Stimpson, 1860). India; Sri Lanka; Malaysia; Indonesia; Gulf of Tonkin; South China Sea; Philippines; Hong Kong; Taiwan; Japan; New Guinea; Northern Territory, Australia.

Genus ***Farfantepenaeus*** Burukovsky, 1997

Figures 39-40

Penaeus - SMITH, 1885b, Proc. U. S. natn. Mus., 8(11/12): 170 [part]; 1886, Rep. U. S. Commnr Fish., for 1885: 684 [part]. — DE MAN, 1911, Siboga Exped., 39a: 95 [part]. — BURKENROAD, 1934b, Bull. Am. Mus. nat. Hist., 68(2): 74 [part]. — KUBO, 1949, J. Tokyo Coll. Fish., 36(1): 268 [part]. — DALL, 1957, Aust. J. mar. Freshwat. Res., 8(2): 141 [part].

Paneus - COLLINS and SMITH, 1892, Bull. U. S. Fish. Commn., 11: 102.

Peneus - ALCOCK, 1905, Ann. Mag. nat. Hist., (7)16: 513 [part]; 1906, Cat. Indian Dec. Crust., 3(1): 7 [part].

Penaeus (Melicertus) - PÉREZ FARFANTE, 1969, Fish. Bull. U.S., 67(3): 466 [part].

Penaeus (Farfantepenaeus) Burukovsky, 1972, Trudy AtlantNIRO, 42: 10, 13, 17. — PÉREZ FARFANTE, 1988, NOAA Tech. Rep., NMFS, 64: 9. — BURUKOVSKY, 1997, Proc. biol. Soc. Wash., 110: 154.

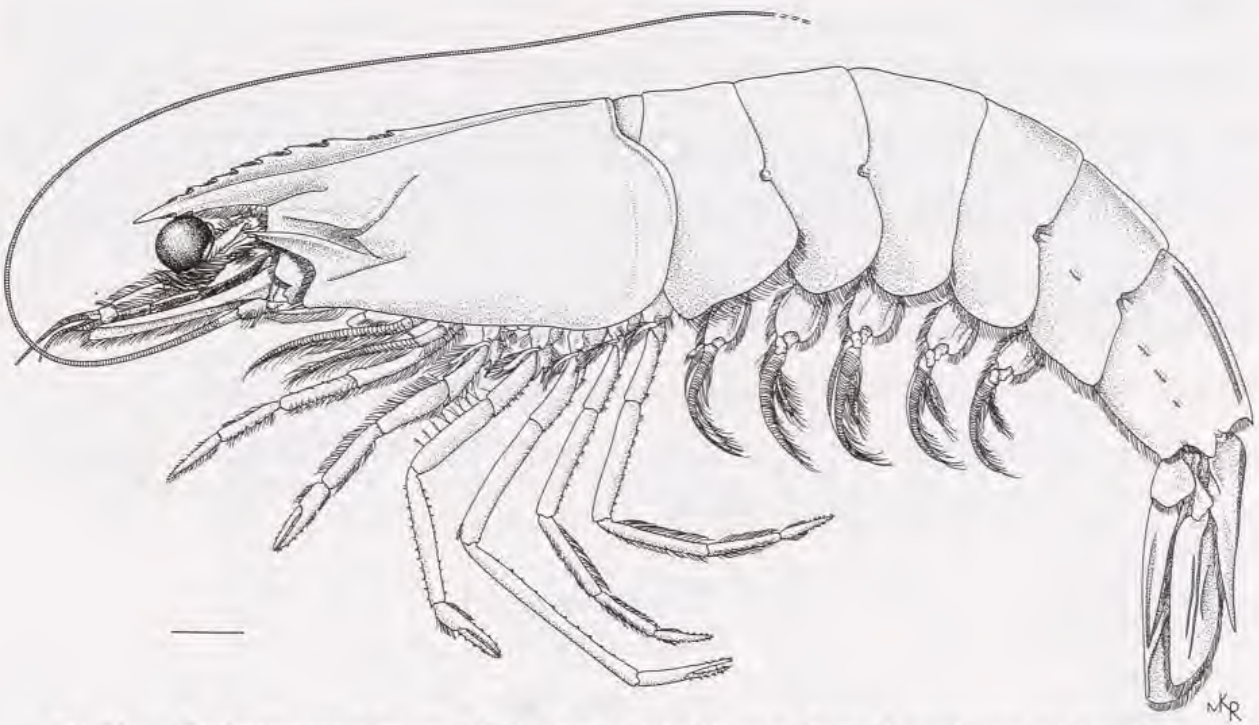


FIG. 39. — *Farfantepenaeus aztecus*, ♀ 51.5 mm cl, off Galveston, Texas. Lateral view. Scale = 10 mm.

Source : MNHN, Paris

TYPE SPECIES: By present designation, *Penaeus brasiliensis* var. *aztecus* Ives, 1891, Proc. Acad. nat. Sci. Philad., 190; lectotype for *Penaeus brasiliensis* var. *aztecus* Ives, designated by PÉREZ FARFANTE, 1969, Fish. Bull., U. S., 67(3): 528.

TYPE LOCALITY: Veracruz, Mexico.

GENDER: Masculine.

DIAGNOSIS. — Integument glabrous. Rostrum with dorsal and usually 2 (occasionally 1 or 3) ventral teeth, moderately long, in young slightly surpassing antennular peduncle, in adult sometimes reaching midlength of second antennular segment. Carapace with antennal and hepatic spines pronounced, lacking orbital and pterygostomian spines; postocular sulcus absent; postrostral carina long, adrostral carina and sulcus usually long, extending almost to posterior margin of carapace, but sometimes only to posterior one-sixth of carapace; gastrofrontal carina not turning anterodorsally upon itself at posterior end; gastro-orbital carina usually long, extending more than three-quarters of distance between hepatic spine and orbital margin; orbito-antennal sulcus well marked; cervical and hepatic carina sharp, accompanying sulci deep; branchiocardiac carina lacking; longitudinal and transverse sutures absent. Sixth abdominal somite bearing three cicatrices, dorsolateral sulcus narrow to quite broad. Telson unarmed.

Antennule lacking parapenaeid spine; antennular flagella much shorter than carapace. Palp of first maxilla elongate, consisting of 3 or 4 articles, distal ones forming flagellum; large basal article produced into setose proximal lobule on lateral and mesial margins and bearing 1, occasionally 2, long subdistomesial spines and distolateral row of spinules. Basial spine on first and second pereopods.

Petasma symmetrical, semiclosed, partly to almost completely hooded by well developed distomedian projections; ventral costae long, strongly curved to almost straight distally, nearly meeting midventrally. Appendix masculina subtriangular to suboval, armed with numerous marginal spines. Thelycum closed, with pair of lateral plates on sternite XIV meeting along midline, shielding simple, median, saclike seminal receptacle; sternite XIII with well developed median protuberance.

ANDREWS (1911) gave an illustrated account of the seminal receptacle of *P. brasiliensis* (= *F. duorarum*), and more recently ELDRED (1958) figured the seminal receptacle of *F. duorarum* and PÉREZ FARFANTE (1969) that of *F. brasiliensis*. The formation and structure of the spermatophores of *F. aztecus* and *F. duorarum* were studied by BAUER and CASH (1991). They consist of a main body containing sperm and a tail-like appendage which when exposed to sea water during insemination unfolds, forming a membrane that fills the slit between the lateral plates and extends along their mesial margins, or spreads over most of the lateral plates (in *F. brevirostris*, pers. obs.), plugging the opening of the seminal receptacle. These spermatophores exhibit a much simpler structure than those of genera with an open thelycum, lacking attachment extensions, wing, flap, flange, and adhesive materials.

Distribution of branchiae, epipods, and exopods in the genus *Farfantepenaeus*.

Somite	VII (Mxp1)	VIII (Mxp2)	IX (Mxp3)	X (P1)	XI (P2)	XII (P3)	XIII (P4)	XIV (P5)
Pleurobranchiae	-	-	1	1	1	1	1	1
Arthrobranchiae	r	2	2	2	2	2	1	-
Podobranchiae	-	1	-	-	-	-	-	-
Epipods	1	1	1	1	1	1	-	-
Exopods	1	1	1	1	1	1	1	1

Source : MNHN, Paris

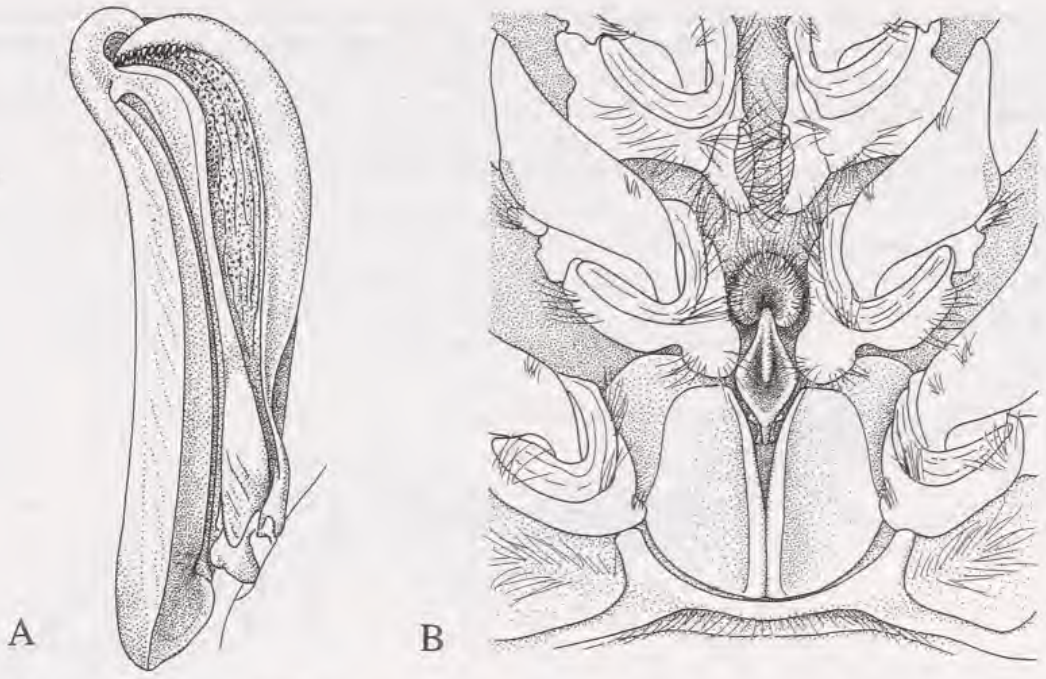


FIG. 40. — *Farfantepenaeus aztecus*: **A**, ♂ 10 mm cl, off Galveston, Texas. Petasma, lateral view. Scale = 1 mm. — **B**, ♀ 51.5 mm cl, off Galveston, Texas. Thelycum. Scale = 5 mm.

SPECIES. — *Farfantepenaeus aztecus* (Ives, 1891). Massachusetts to Florida; Gulf of Mexico to Yucatan.

Farfantepenaeus brasiliensis (Latreille, 1817). North Carolina to Florida Keys, southern Gulf of Mexico to Yucatan; West Indies; Caribbean coast of Central and South America to Rio Grande do Sul, Brazil; Bermuda.

Farfantepenaeus brevirostris (Kingsley, 1878). Western Baja California Sur and Gulf of California to northern Peru; Galapagos Islands.

Farfantepenaeus californiensis (Holmes, 1900). San Francisco Bay, California; Western Baja California Norte; Gulf of California to Callao, Peru; Galapagos Islands.

Farfantepenaeus duorarum (Burkenroad, 1939). Chesapeake Bay to Florida; Gulf of Mexico; Dry Tortugas to Cape Catoche, south to Islas Mujeres; Bermuda.

Farfantepenaeus notialis (Pérez Farfante, 1967). Western Atlantic Ocean; from Cuba to Virgin Islands; Quintana Roo, Mexico, Caribbean coast of Central and South America to Brazil; eastern Atlantic Ocean from Mauritania to Angola.

Farfantepenaeus paulensis (Pérez Farfante, 1967). Cabo Frio, Brazil, to Buenos Aires Province, Argentina.

Farfantepenaeus subtilis (Pérez Farfante, 1967). Cuba; Antilles; Caribbean coast of Central and South America from Honduras to Rio de Janeiro, Brazil.

Genus ***Fenneropenaeus*** Pérez Farfante, 1969

Figures 41-42

Cancer - OSBECK, 1765, Reise Ostind. China, : 151 [part].
Peneus - ALCOCK, 1905, Ann. Mag. nat. Hist., (7)16: 513; 1906, Cat. Indian Dec. Crust., 3(1): 7 [part].

Source : MNHN, Paris

Penaeus - DE MAN, 1911, Siboga Exped., 39a: 95 [part]. — BURKENROAD, 1934b, Bull. Am. Mus. nat. Hist., 68(2): 74 [part]. — KUBO, 1949, J. Tokyo Coll. Fish., 36(1): 268 [part]. — DALL, 1957, Aust. J. mar. Freshwat. Res., 8(2): 141 [part].

Penaeus (Fenneropenaeus) Pérez Farfante, 1969, Fish. Bull., U. S., 67(3): 466. — LIU and ZHONG, 1988, Penaeoid Shr. S. China Sea, : 105. — HAYASHI, 1992, Dendr. Crust. Jap. Waters, : 122.

Penaeus (Penaeus) - BURUKOVSKY, 1972, Trudy AtlantNIRO, 42: 5, 8, 13, 16.

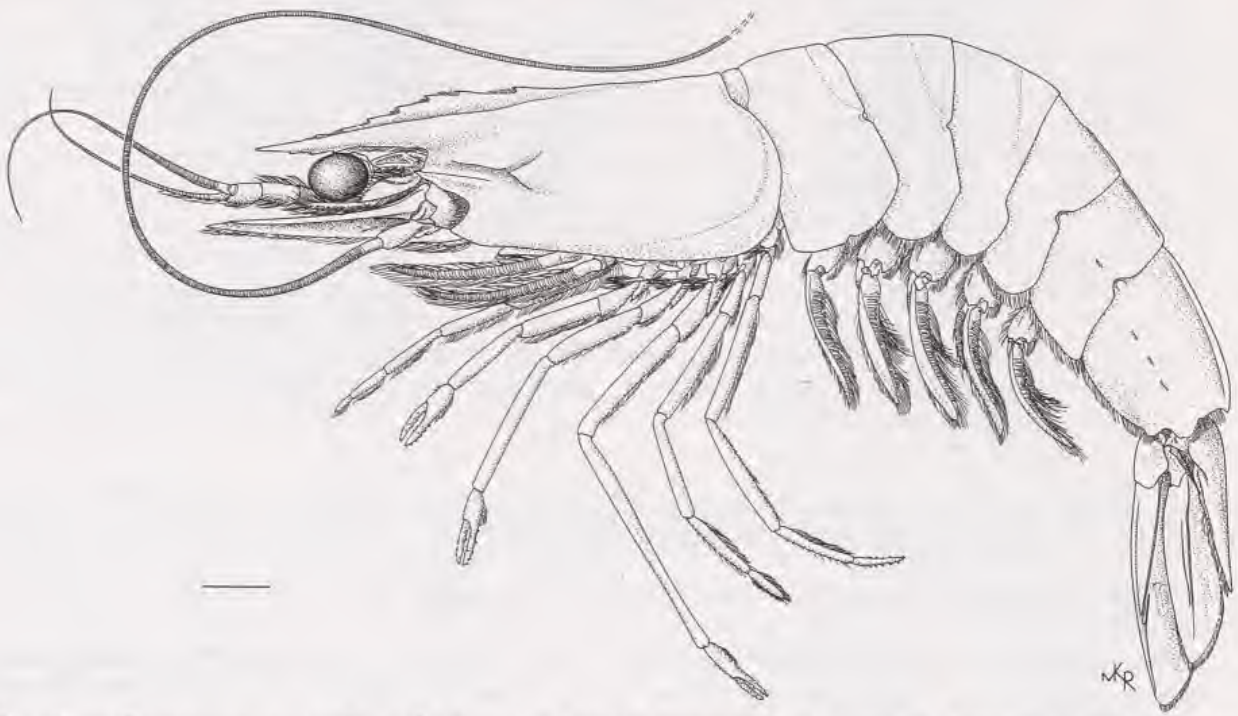


FIG. 41. — *Fenneropenaeus indicus*, ♀ 46 mm cl, Joseph Bonaparte Gulf, Northern Territory, Australia. Lateral view. Scale = 1 mm.

TYPE SPECIES: By original designation, *Penaeus indicus* H. Milne Edwards, 1837, Hist. Nat. Crust., 2: 415.

TYPE LOCALITY: Coast of Coromandel, India.

GENDER: Masculine.

DIAGNOSIS. — Integument glabrous. Rostrum armed with dorsal and 2-5 ventral teeth, long in young, conspicuously surpassing antennular flagella, rather short in adult, reaching between midlength and about distal end of second antennular segment. Carapace with antennal and hepatic spines pronounced, lacking orbital and pterygostomian spines; postocular sulcus absent; postrostral carina short to rather long, reaching as far as posterior one-eighth of carapace; adrostral carina and sulcus short, falling distinctly short or extending to about level of epigastric tooth; gastrofrontal carina absent; gastro-orbital carina usually absent or feeble, but occasionally rather well defined, if present occupying middle one-third or not more than posterior two-thirds of distance between hepatic spine and orbital margin; orbito-antennal sulcus often shallow or poorly marked; cervical carina well defined, accompanying sulcus well defined or feeble; hepatic carina more often absent, if present, moderately or ill-defined; branchiocardiac carina lacking; longitudinal and transverse sutures absent. Sixth abdominal somite bearing three cicatrices, lacking dorsolateral sulcus. Telson unarmed.

Source : MNHN, Paris

Antennule lacking parapenaeid spine; antennular flagella much shorter than carapace. Palp of first maxilla elongate, slender, either biarticulate, or consisting of 3 or 4 articles, large basal article produced in setose proximal lobules on lateral and mesial margins, bearing 1 long mesiodistal spine, and elongate distolateral patch of spinules. Basial and ischial spines on first pereopod, only basial spine on second.

Petasma symmetrical, semiclosed, with distomedian projections usually quite short, ventral costae long, strongly curved and gaping distally. Appendix masculina subelliptical or, occasionally, broadly subtriangular and armed with closely set marginal spines and sometimes with submarginal patches of spinules. Thelycum closed, with pair of lateral plates on sternite XIV forming thick mesial lips meeting along midline, shielding simple, median, saclike seminal receptacle; sternite XIII with well developed median protuberance.

Distribution of branchiae, epipods, and exopods in the genus *Fenneropenaeus*.

Somite	VII (Mxp1)	VIII (Mxp2)	IX (Mxp3)	X (P1)	XI (P2)	XII (P3)	XIII (P4)	XIV (P5)
Pleurobranchiae	-	-	1	1	1	1	1	1
Arthrobranchiae	r	2	2	2	2	2	1	-
Podobranchiae	-	1	-	-	-	-	-	-
Epipods	1	1	1	1	1	1	-	-
Exopods	1	1	1	1	1	1	1	1

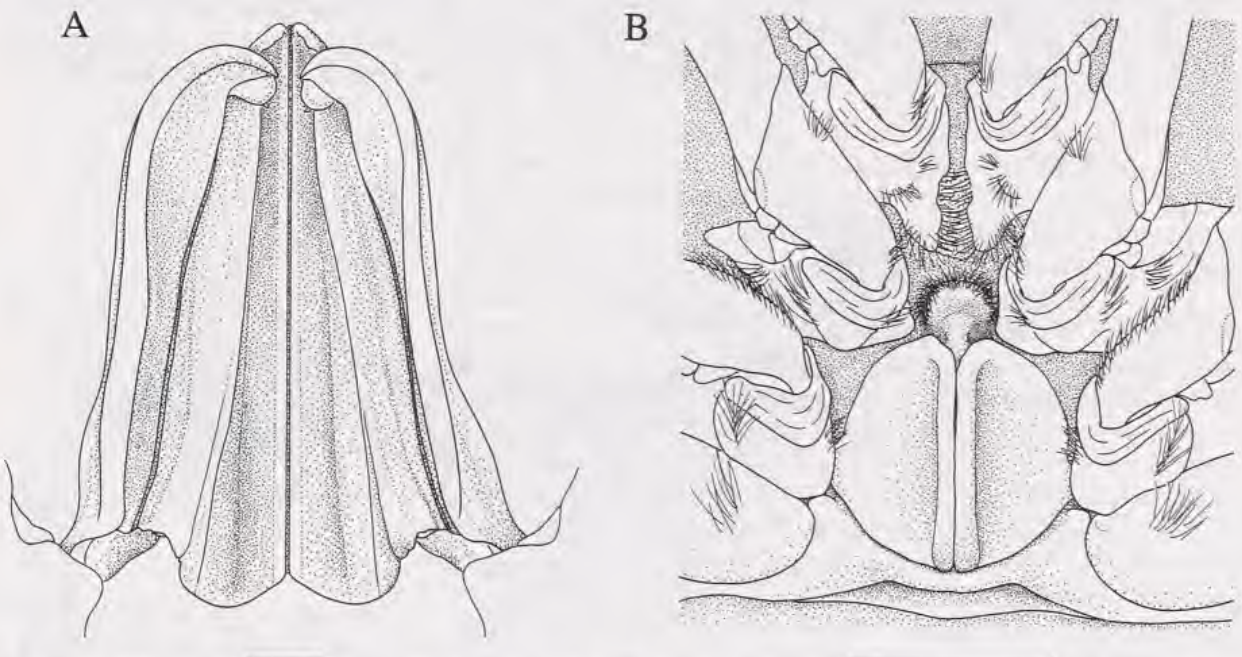


FIG. 42. — *Fenneropenaeus indicus*: **A**, ♂ 32 mm cl, off Yemen, Red Sea. Petasma, ventral view. Scale = 1 mm. — **B**, ♀ 46 mm cl, Joseph Bonaparte Gulf, Northern Territory, Australia. Thelycum. Scale = 5 mm.

The seminal receptacles and spermatophores of *Fenneropenaeus merguiensis* were described in detail by TUMA (1967). The formation and structure of the spermatophores of *Fenneropenaeus*

Source : MNHN, Paris

indicus were described by CHAMPION (1987). They are similar to those of the species of genera having a closed thelycum previously included in *Penaeus* s.l., with the exception of *Marsupenaeus*.

SPECIES. — *Fenneropenaeus chinensis* (Osbeck, 1765). Hong Kong; China; Korea; Japan.

Fenneropenaeus indicus (H. Milne Edwards, 1837). South-east and east Africa to Red Sea; Madagascar; Yemen to southern China; Philippines; Japan; New Guinea; northern Australia.

Fenneropenaeus merguiensis (De Man, 1888). Persian Gulf; Pakistan; Western and southern India; Sri Lanka; Malaysia; Singapore; Thailand; Indonesia; Gulf of Tonkin; South China Sea; Philippines; Hong Kong; New Guinea; northern Australia; Fiji; New Caledonia.

Fenneropenaeus penicillatus (Alcock, 1905). Pakistan; India; Indonesia; China; Taiwan.

Fenneropenaeus silasi (Muthu and Motoh, 1979a). Singapore; Borneo; Sarawak.

Genus ***Funchalia*** Johnson, 1867

Figures 43-45

Funchalia Johnson, 1867, Proc. zool. Soc. Lond., 1867: 895. — BOUVIER, 1908b, Bull. Inst. océanogr. Monaco, 119: 3; 1908a, Résult. Camp. scient. Prince Albert I, 33: 91. — LENZ and STRUNCK, 1914, Dt. Südpol.-Exped., 15, Zool. 7: 303. — BALSS, 1925, Wiss. Ergebn. Dt.-Tiefsee Exped. Valdivia, 20(5): 227. — CALMAN, 1925, Rep. Fish. mar. biol. Surv. Un. S. Afr., 4, spec. rep. 3: 10. — BURKENROAD, 1934b, Bull. Am. Mus. nat. Hist., 68(2): 73-77; 1936b, Bull. Bingham oceanogr. Coll., 5(2): 126. — ROGER, 1938, Bull. Soc. Zool. Fr., 63: 23. — BARNARD, 1950, Ann. S. Afr. Mus., 38: 608. — GORDON and INGLE, 1956, J. mar. biol. Ass. U. K., 35: 475 [part]. — DALL, 1957, Aust. J. mar. Freshwat. Res., 8(2): 163 [part]. — CROSNIER and FOREST, 1973, Faune Trop., 19: 296 [part]. — GRIPPA, 1976, Atti Soc. ital. Sci. nat., 117(3/4): 124. — BURKENROAD, 1983, Crust. Issues, 1: 282. — DE FREITAS, 1987, Investl. Rep. Oceanogr. Res. Inst., Durban, 58: 3. —

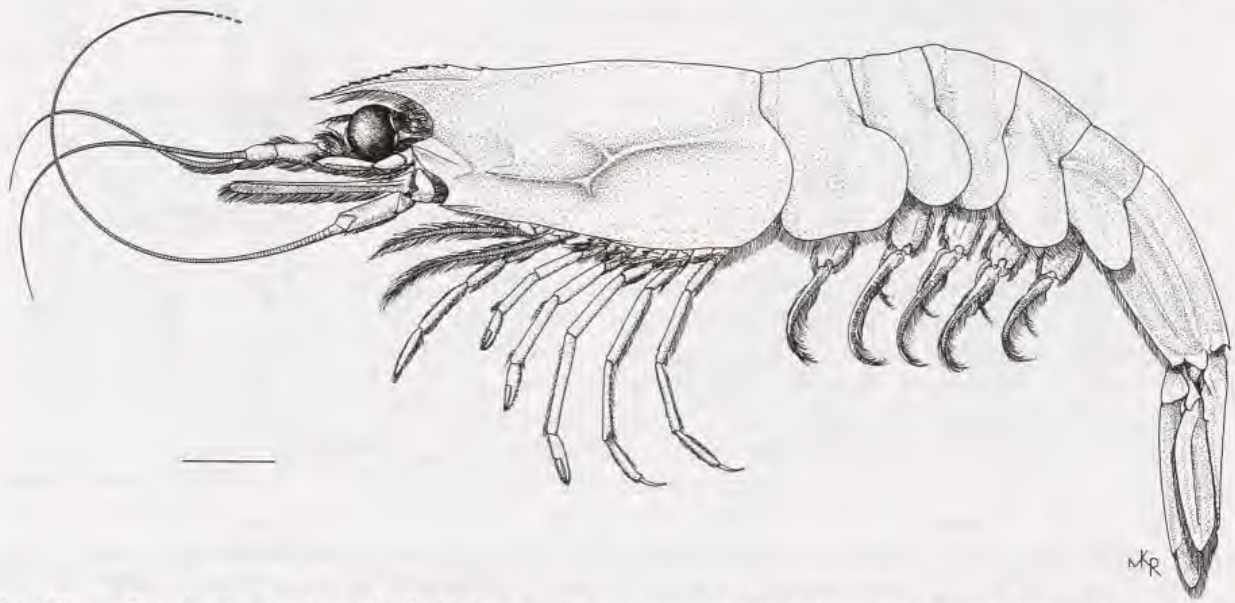


FIG. 43. — *Funchalia woodwardi*, ♀ 35.5 mm cl, southeast Atlantic Ocean off South Africa. Lateral view. Scale = 10 mm.

Source : MNHN, Paris

GRIPPA, 1987, Investnes Pesq., 51 (suppl. 1): 73. — WASMER, 1989, J. nat. Hist., 23: 476. — DALL *et al.*, 1990, Adv. Mar. Biol., 27: 66. — BURUKOVSKY and ROMENSKY, 1991, Biul. Moskovsk. Obsh. Ispyt. Prir.: 60. Placed on the Official List of Generic Names in Zoology, International Commission of Zoological Nomenclature, 1969, Opinion 864, Name No. 1810, Bull. zool. Nom., 25(4/5): 139.

Sicyonia - GÉNY, 1873, Ann. Soc. Lettres Sci. Arts Alpes-Maritimes, 2: 162 [part].

Aristeus - BATE, 1888, Rep. scient. Results Voy. Challenger, 24: 309 [part]. — SENNA, 1903, Boll. Soc. ent. ital., 34(4): 261 [part].

Penaeus - ALCOCK, 1905, Ann. Mag. nat. Hist., (7)36(95): 513 [part].

Grimaldiella Bouvier, 1905a, C. r. hebd. Séanc. Acad. Sci., Paris, 140: 981, 982. Type species: By monotypy, *Grimaldiella richardi* Bouvier, 1905a, C. r. hebd. Séanc. Acad. Sci., Paris, 140: 982. (= *Funchalia woodwardi* Johnson, 1867). Type locality: Off Ile Saint-Michel, Azores.

Hemipenaeopsis Bouvier, 1905a, C. r. hebd. Séanc. Acad. Sci., Paris, 140: 981. Type species: By monotypy, *Hemipenaeopsis villosus* Bouvier, 1905a, C. r. hebd. Séanc. Acad. Sci., Paris, 140: 981. Type locality: North-east Atlantic Ocean, between Canary Islands and Azores. Gender: Feminine.

Funchalia (Funchalia) - BURKENROAD, 1934b, Bull. Am. Mus. nat. Hist., 68(2): 73, 76; 1936, Bull. Bingham oceanogr. Coll., 5(2): 126.

Funchalis - BURKENROAD, 1936b, Bull. Bingham oceanogr. Coll., 5(2): 136.

TYPE SPECIES: By monotypy, *Funchalia woodwardi* Johnson, 1867, Proc. zool. Soc. Lond., 1867: 895.

TYPE LOCALITY: Off Madeira, north-east Atlantic Ocean.

GENDER: Feminine.

DIAGNOSIS. — Integument pubescent. Rostrum short, compressed, reaching as far as midlength of second antennular segment, armed with dorsal teeth only. Carapace lacking orbital spine (angle only occasionally slightly marked), with antennal and pterygostomian spines, hepatic spine present or absent; postocular sulcus lacking; gastro-orbital carina absent; orbito-antennal and cervical sulci weak or absent; postrostral carina pronounced or feeble; antennal, pterygostomian, and branchiocardiac carinae well marked; dorsolateral carina lacking; hepatic carina present or lacking; without longitudinal and transverse sutures. Fourth, fifth, and sixth abdominal somites bearing continuous, prominent cicatrix. Telson with three pairs of fixed subapical spines, preceded by much smaller ones.

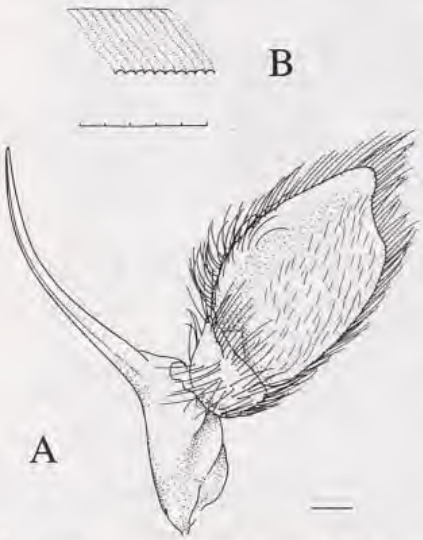


FIG. 44. — *Funchalia woodwardi*, ♀ 35.5 mm cl, southeast Atlantic Ocean off South Africa. **A**, Mandible, ventral view of left side. Scale = 1 mm. **B**, Cutting edge of mandible enlarged. Scale = 0.5 mm.

Antennule lacking parapenaeid spine; antennular flagella subfiliform, long, dorsal one as long as or longer than carapace and slightly longer than ventral. Mandibles with incisor processes extremely elongate, scythelike and crossing posterior to labrum, ventral cutting edge minutely denticulate, submarginally striate; distal article of mandibular palp large, asymmetrical, truncate. Palp of first maxilla relatively long, slender, triarticulate, basal article armed with minute proximomesial lobe, distolateral row of spinules, and long subdistal spine on mesial margin; distal article bearing long apical setae. Dactyl of third maxilliped sexually dimorphic; broadened and roughly spoon-shaped in males, narrow and subcylindrical in females. Ridge of lateral ramus of uropod produced into conspicuous spine. Basial and ischial spines on first and second pereopods. Epipods strongly forked.

Source : MNHN, Paris

Petasma semi-open, asymmetrical with either right or left half longer than opposite. Appendix masculina subrectangular. Thelycum open, with anterior depression on sternite XIV flanked by pair of large broad flaps or narrow ones bearing strong ridges; median protuberance on sternite XIII deeply excavate, delimiting depression on sternite XIV.

Distribution of branchiae, epipods, and exopods in the genus *Funchalia*.

Somite	VII (Mxp1)	VIII (Mxp2)	IX (Mxp3)	X (P1)	XI (P2)	XII (P3)	XIII (P4)	XIV (P5)
Pleurobranchiae	-	-	1	1	1	1	1	1
Arthrobranchiae	r	2	2	2	2	2	1	-
Podobranchiae	-	1	-	-	-	-	-	-
Epipods	1	1	1	1	1	1	-	-
Exopods	s	s	s	s	s	s	s	s

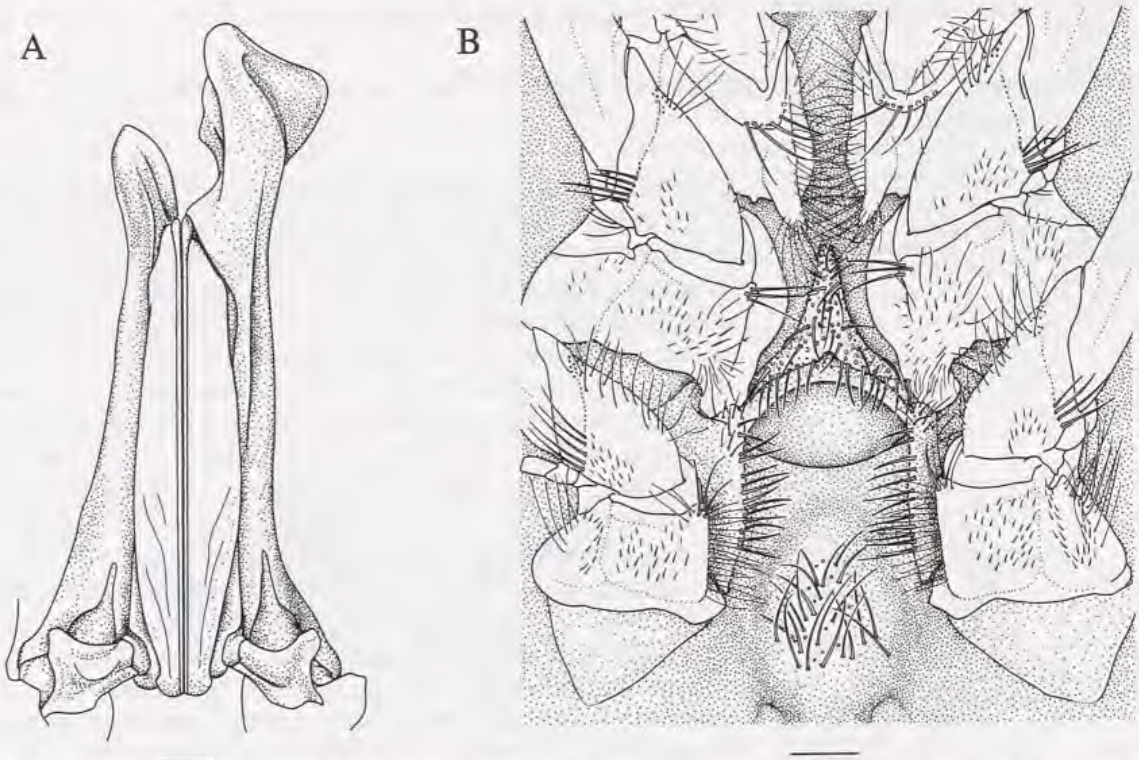


FIG. 45. — *Funchalia woodwardi*: **A**, ♂ 37.5 mm cl, southeast Atlantic Ocean off South Africa. Petasma, dorsal view. — **B**, ♀ 35.5 mm cl, southeast Atlantic Ocean off South Africa. Thelycum. Scales = 1 mm.

REMARKS. — *Funchalia sagamiensis* was described from a single juvenile specimen (7 mm carapace length and of undetermined sex), which possesses three characters that differ from those typical of the members of *Funchalia*: it lacks exopods on all pereopods, basial and ischial spines on the first and second pereopods, and the telson bears two pairs of movable lateral spines anterior to the fixed subapical pair; this juvenile has not been associated with an adult. HAYASHI (1992) found a small female (8 mm carapace length) in Japanese waters which shares many characters with *F. sagamiensis*, but it bears small prominences on the pereopods which resemble

Source : MNHN, Paris

buds of exopods. Although HAYASHI tentatively assigned it to *F. sagamiensis* he suggested that the specimen might possibly belong to *F. villosa* or *F. taaningi*. Because the members of *Funchalia* undergo considerable changes in their development, the identities of these two juvenile shrimps must await the study of additional, more nearly adult material.

SPECIES. — *Funchalia danae* Burkenroad, 1940. Azores; Off Canary Islands; Saint Helena Island; Congo; Arabian Sea; south-central Indian Ocean; north-west Pacific Ocean.

?*Funchalia sagamiensis* Fujino, 1975. Japan.

Funchalia taaningi Burkenroad, 1940. Madagascar; western and eastern Indian Ocean; Indonesia; Japan; central and north-west Pacific Ocean.

Funchalia villosa (Bouvier, 1905a). Caribbean; Canary Islands; Mediterranean; southern Atlantic Ocean off Tristan da Cunha; Antarctic; south-west Indian Ocean from Agulhas Bank to Natal, South Africa; eastern Indian Ocean; Lord Howe Island and off New South Wales, Australia.

Funchalia woodwardi Johnson, 1867. Outer Hebrides, north-east Atlantic Ocean; Azores; Madeira; Mediterranean; south-east Atlantic Ocean off Cape of Good Hope, South Africa; Arabian Sea; New South Wales, Australia.

Genus ***Heteropenaeus*** De Man, 1896

Figures 46-47

Heteropenaeus De Man, 1896, Zool. Anz., 19(498): 111; 1898, Zool. Jahrb., 10: 684. — NOBILI, 1903, Boll. Musei Zool. Anat. comp. R. Univ. Torino, 18(455): 4. — ALCOCK, 1905, Ann. Mag. nat. Hist., (7)16: 515; 1906, Cat. Indian Dec. Crust., 3(1): 16. — DE MAN, 1924, Arch. Naturgesch., 90 A (2): 30. — BALSS, 1957, Bronn's Kl. Ordn. Tierreichs, 5(1)7: 12: 1518. — HALL, 1961, Bull. Raffles Mus., 26: 83. — DALL *et al.*, 1990, Adv. Mar. Biol., 27: 68.

Placed on the Official List of Generic Names in Zoology, International Commission on Zoological Nomenclature, 1969, Opinion 864, Name No. 1815, Bull. zool. Nom., 25(4/5): 139.

Heteropeneus - BURKENROAD, 1983, Crust. Issues, 1: 282.

TYPE SPECIES: By monotypy, *Heteropenaeus longimanus* De Man, 1896, Zool. Anz., 19(498): 111.

TYPE LOCALITY: Java Sea.

GENDER: Masculine.

DIAGNOSIS. — Integument of carapace and abdomen bearing rows of densely-set short stiff variously-directed setae, mostly projecting from one margin of numerous sulci of varying length. Rostrum armed with dorsal teeth along entire length, ventral teeth on anterior half, moderately long, reaching or slightly overreaching antennular peduncle. Carapace with acutely pointed antennal and hepatic spines; orbital and pterygostomian spines lacking; unique subrostral sulcus[1] present; orbito-antennal sulcus well defined only posteriorly. Postrostral carina well defined to near posterior margin of carapace; short gastro-orbital and antennal carina present; cervical carina sharp, sulcus deep; hepatic carina and sulcus well marked, extending anteroventrally below hepatic spine then curving ventrally, also extending posterodorsally to about midlength of

[1]While this sulcus is in the postocular position, its unusual length and peculiar armature suggest that it is not homologous with the postocular sulci of the rest of the 'tribe'. The term 'subrostral sulcus' may be more appropriate.

Source : MNHN, Paris

cervical sulcus; branchiocardiac carina and sulcus clearly defined; longitudinal and transverse sutures absent. Abdomen with numerous, variously directed small grooves; sixth abdominal somite without cicatrices, bearing long subdorsolateral sulcus. Telson with four pairs of relatively long movable lateral spines.

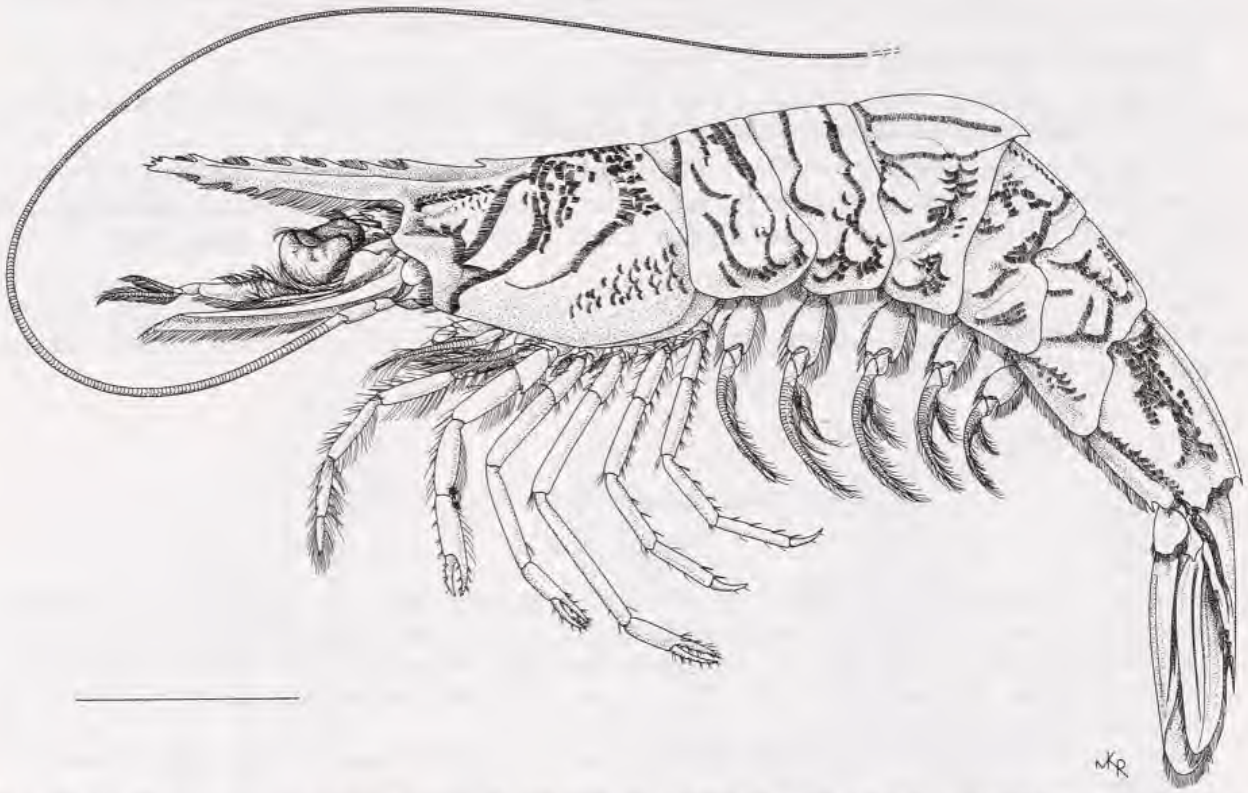


FIG. 46. — *Heteropenaeus longimanus*, ♀ 12 mm cl, Masinloc Bay, Luzon, Philippines. Lateral view. Scale = 10 mm.

Eye with basal plate produced into sharp spine. Antennule lacking parapenaeid spine; antennular flagella short, less than half length of carapace. Mandible with incisor process short, molar process broad, thick. Palp of first maxilla long, triarticulate, basal article with broad proximolateral and smaller proximomesial setose lobules, bearing spine just distal to proximomesial lobe and comb of subdistolateral spinules; distal article elongate, slender, bearing five long slender spines. First pereopod in adult males sometimes stouter and considerably longer than second and third; fingers of chela half length of propodal palm in male, subequal in length to propodal palm in female. Basial and ischial spines on first pereopod, only basial spine on second.

Petasma symmetrical, semi-open, not hooded and with long ventral costae widely gaping, dorsolateral lobule extending apically into acute slender projection. Appendix masculina ovate, with submesial setose rib where turning mesially at right-angle. Thelycum open, with paired, strongly elevated (ventrally), lateral plates flanking deep depression on sternite XIV; median protuberance on sternite XIII strongly excavate, forming roughly inverted V-shaped ridge, crowning depression of XIV.

REMARKS. — The extraordinarily elongate first pereopod was described by DE MAN (1896) for the syntypic male from the Java Sea. This feature has since not been commented on nor

Source : MNHN, Paris

illustrated, neither was it seen in the seven males we have examined. However, Alain CROSNIER (in litt., 1996) assures us that *Heteropenaeus longimanus* can be bought by the kilogram in fish markets in the Philippines, and that only very large males, which are not all that common, possesses the very long first pereopods. He quotes a specimen with a carapace length of 17.5 mm as having a first pereopod of 66 mm, with an extremely elongate propod.

Distribution of branchiae, epipods, and exopods in the genus *Heteropenaeus*.

Somite	VII (Mxp1)	VIII (Mxp2)	IX (Mxp3)	X (P1)	XI (P2)	XII (P3)	XIII (P4)	XIV (P5)
Pleurobranchiae	-	-	1	1	1	1	1	1
Arthrobranchiae	r	2	2	2	2	2	1	-
Podobranchiae	-	1	-	-	-	-	-	-
Epipods	1	1	1	1	1	1	-	-
Exopods	1	1	1	s	s	s	s	s

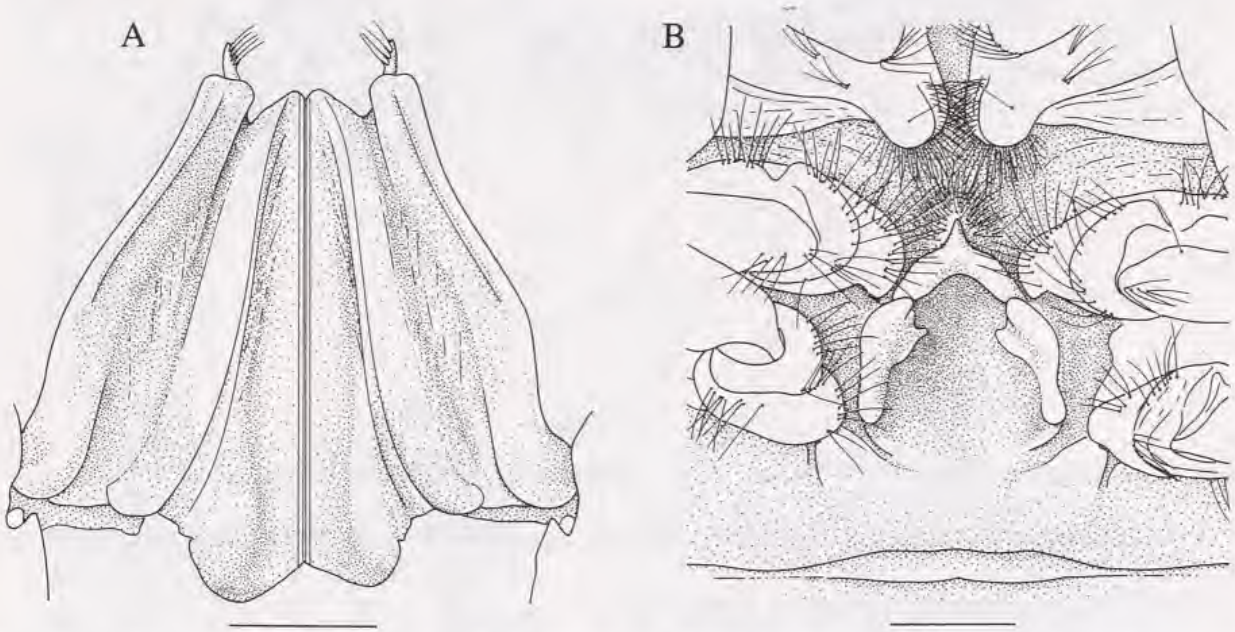


FIG. 47. — *Heteropenaeus longimanus*: **A**, ♀ 12 mm cl, Tumindao Island, Sulu Archipelago, Philippines. Petasma, dorsal view. — **B**, ♀ 12 mm cl, Masinloc Bay, Luzon, Philippines. Thelycum. Scales = 1 mm.

SPECIES. — *Heteropenaeus longimanus* De Man, 1896. Singapore; Java, Ternate, Indonesia; Philippines; Japan; New Guinea; Australia; Palau; Caroline Islands.

Genus ***Litopenaeus*** Pérez Farfante, 1969

Figures 48-49

Cancer - LINNAEUS, 1767, Syst. Nat. (12th ed.), 1(2): 1054 [part].

Penaeus - SMITH, 1885b, Proc. U. S. natn. Mus., 8(11/12): 170 [part]; 1886, Rep. U. S. Commnr Fish., for 1885: 684 [part]. — DE MAN, 1911, Siboga Exped., 39a: 95 [part]. — BURKENROAD, 1934b, Bull. Am. Mus.

Source : MNHN, Paris

nat. Hist., 68(2): 74 [part]. — KUBO, 1949, J. Tokyo Coll. Fish., 36(1): 268 [part]. — DALL, 1957, Austr. J. mar. Freshwat. Res., 8(2): 14 [part].

Panaeus - THALLWITZ, 1892, Abh. Ber. zool. antrop.-ethn. Mus. Dresden, 1890-91, 3(3): 3. [*Panaeus gracilirostris* = *P. setiferus* according to BURKENROAD, 1939, Bull. Bingham oceanogr. Coll., 6(6): 17].

Peneus - ALCOCK, 1905, Ann. Mag. nat. Hist., 7(16): 513 [part]; 1906, Cat. Indian Dec. Crust., 3(1): 7 [part].

Penaeus (Litopenaeus) Pérez Farfante, 1969, Fish. Bull., U. S., 67(3): 466. — BURUKOVSKY, 1972, Trudy AtlantNIRO, 42: 5, 8, 13, 15. — PÉREZ FARFANTE, 1975, Fish. Bull., U. S., 73(3): 463; 1988, NOAA Tech. Rep., NMFS, 64: 9.

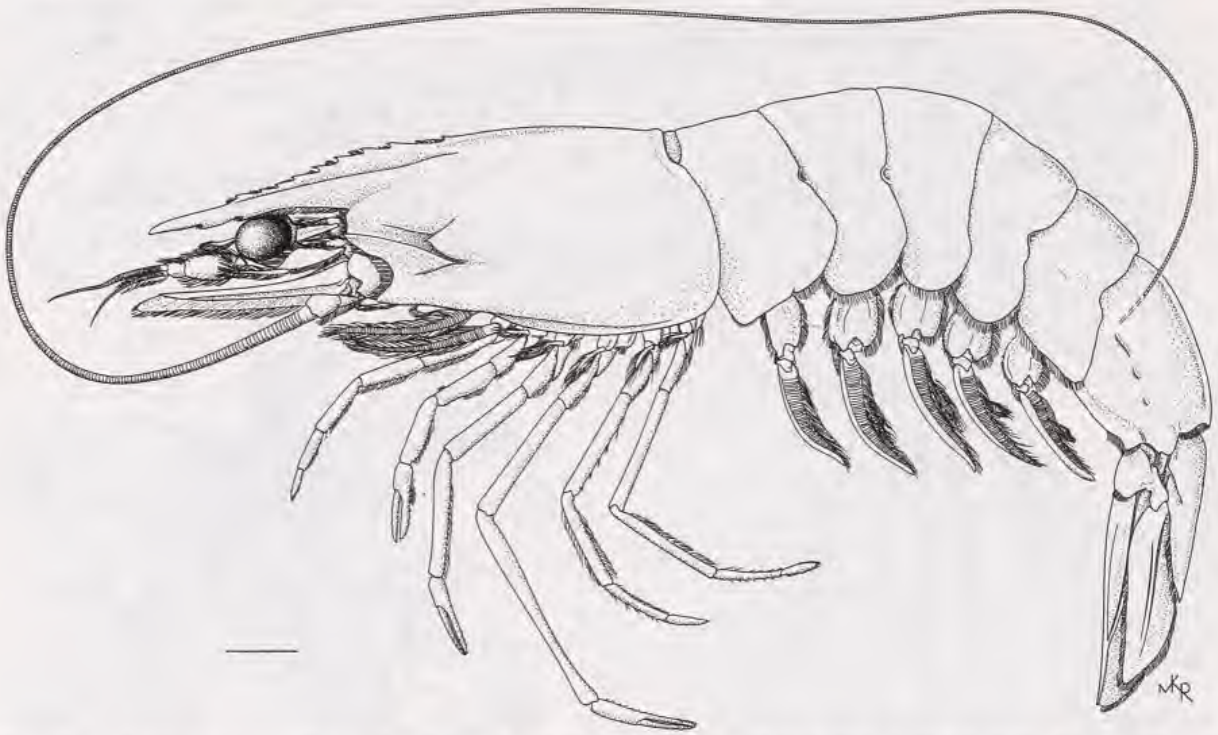


FIG. 48. — *Litopenaeus setiferus*, ♀ 38 mm cl, off Long Beach, North Carolina. Lateral view. Scale = 10 mm.

TYPE SPECIES: By original designation, *Penaeus vannamei* Boone, 1931, Bull. Am. Mus. nat. Hist., 63(2): 173.

TYPE LOCALITY: Panama [Golfo de Panama].

GENDER: Masculine.

DIAGNOSIS. — Integument glabrous. Rostrum armed with dorsal and usually, 2-4 (occasionally 1, 5-8) ventral teeth, moderately long, in young distinctly surpassing antennular peduncle, shorter in adult, sometimes reaching only midlength of second antennular segment. Carapace with antennal and hepatic spines pronounced, lacking orbital and pterygostomian spines; postocular sulcus absent; postrostral carina variable in length, sometimes almost reaching posterior margin of carapace; adrostral carina and sulcus short, extending to, or only slightly beyond epigastric tooth; gastrofrontal carina absent; gastro-orbital carina relatively short, usually extending (at most) anteriorly about two-thirds of distance between hepatic spine and orbital margin; orbito-antennal sulcus well marked; cervical and hepatic carinae sharp, accompanying sulci deep; branchiocardiac carina lacking; longitudinal and transverse sutures absent. Sixth abdominal somite bearing three cicatrices, dorsolateral sulcus extremely narrow or absent. Telson unarmed.

Source : MNHN, Paris

Antennule lacking parapenaeid spine; antennular flagella much shorter than carapace. Palp of first maxilla elongate, consisting of 3 or 4 articles, distal ones together flagelliform; basal article produced in setose proximal lobes on lateral and mesial margins, bearing 1 or 2 long distomesial spines, and distolateral row of spinules. Basial and ischial spines on first pereopod, basial on second.

Petasma symmetrical, semi-open, not hooded, lacking distomedian projections; ventral costae short, not nearly reaching distal margin, and distinctly gaping. Thelycum open, sternite XIV bearing ridges, prominences, depressions, or grooves. Spermatophores extremely complex, consisting of a sperm mass encapsulated by a sheath and bearing various attachment structures (anterior wing, lateral flap, caudal flange, dorsal plate), as well as adhesive and glutinous materials.

Detailed descriptions of the spermatophores of all *Litopenaeus* species were given by PÉREZ FARFANTE (1975), and that of *Litopenaeus stylirostris* by CÁRDENAS FIGUEROA (1952). Studies of the formation and structure of the spermatophore of *L. setiferus* were made by BAUER (1991), and CHOW *et al.* (1990); the latter also discussed the spermatophore of *L. vannamei*.

Distribution of branchiae, epipods, and exopods in the genus *Litopenaeus*.

Somite	VII (Mxp1)	VIII (Mxp2)	IX (Mxp3)	X (P1)	XI (P2)	XII (P3)	XIII (P4)	XIV (P5)
Pleurobranchiae	-	-	1	1	1	1	1	1
Arthrobranchiae	r	2	2	2	2	2	1	-
Podobranchiae	-	1	-	-	-	-	-	-
Epipods	1	1	1	1	1	1	-	-
Exopods	1	1	1	1	1	1	1	1

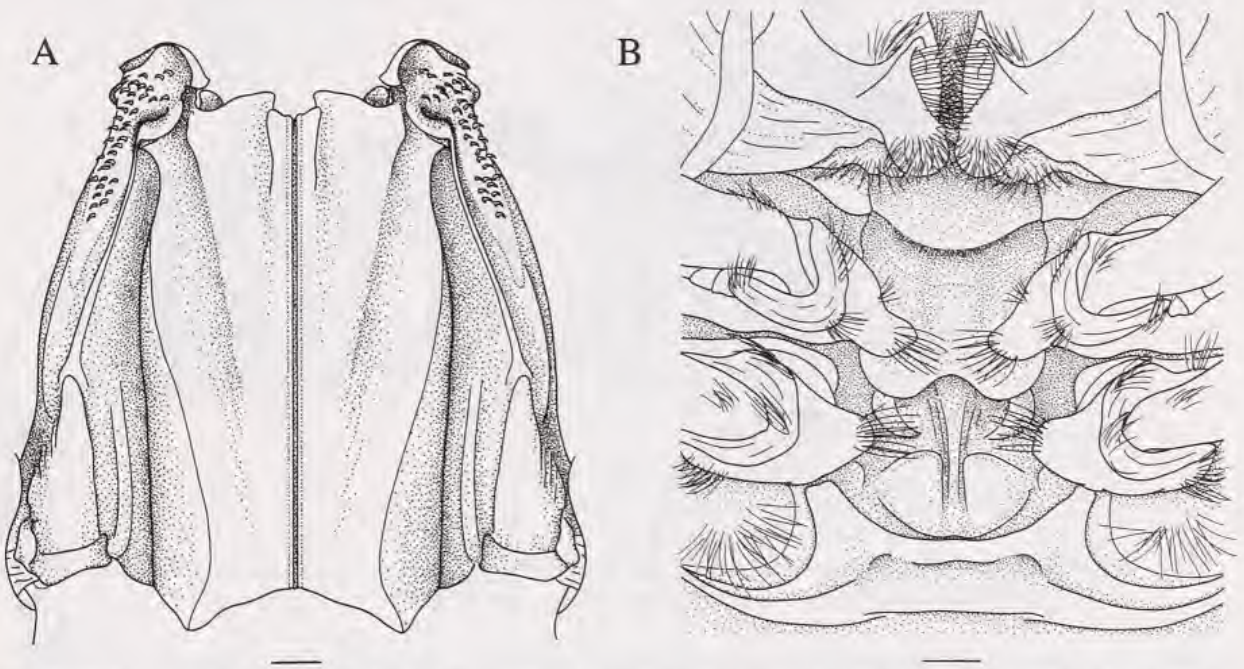


FIG. 49. — *Litopenaeus setiferus*: **A**, ♂ 40 mm cl, off Galveston, Texas. Petasma, dorsal view. Scale = 1 mm. — **B**, ♀ 47 mm cl, off Galveston, Texas. Thelycum. Scale = 10 mm.

Source : MNHN, Paris

SPECIES. — *Litopenaeus occidentalis* (Streets, 1871). Chiapas, Gulf of Tehuantepec, Mexico; El Salvador; Gulf of Panama; Colombia to northern Peru; Galapagos Islands.

Litopenaeus schmitti (Burkenroad, 1936a). Cuba to Trinidad; Belize; Caribbean coast of Central and South America to southern Brazil.

Litopenaeus setiferus (Linnaeus, 1767). Fire Island and Nyack, (Hudson River), New York to Florida; Gulf of Mexico to Yucatan.

Litopenaeus stylirostris (Stimpson, 1874). Western Baja California Norte; Gulf of California to northern Peru.

Litopenaeus vannamei (Boone, 1931). Gulf of California to northern Peru.

Genus ***Macropetasma*** Stebbing, 1914

Figures 50-51

Parapeneus - BALSS, 1913b, in SCHULTZE, Forschungsreise Südafr., 5 (2), Jena Denkschr., 17: 105.

Macropetasma Stebbing, 1914, Ann. S. Afr. Mus., 15(1): 22. — BURKENROAD, 1934a, Bull. Bingham oceanogr. Coll., 4(7): 8; 1934b, Bull. Am. Mus. nat. Hist., 68(2): 73, 117. — BARNARD, 1947, Ann. Mag. nat. Hist., (11)13: 382; 1950, Ann. S. Afr. Mus., 38: 605. — HOLTHUIS, 1962, Bull. zool. Nom., 19(2): 108. — BURKENROAD, 1983, Crust. Issues, 1: 282. — DALL *et al.*, 1990, Adv. Mar. Biol., 27: 70.

Placed on the Official List of Generic Names in Zoology, International Commission on Zoological Nomenclature, 1969, Opinion 864, Name No. 1818, Bull. zool. Nom., 25(4/5): 139.

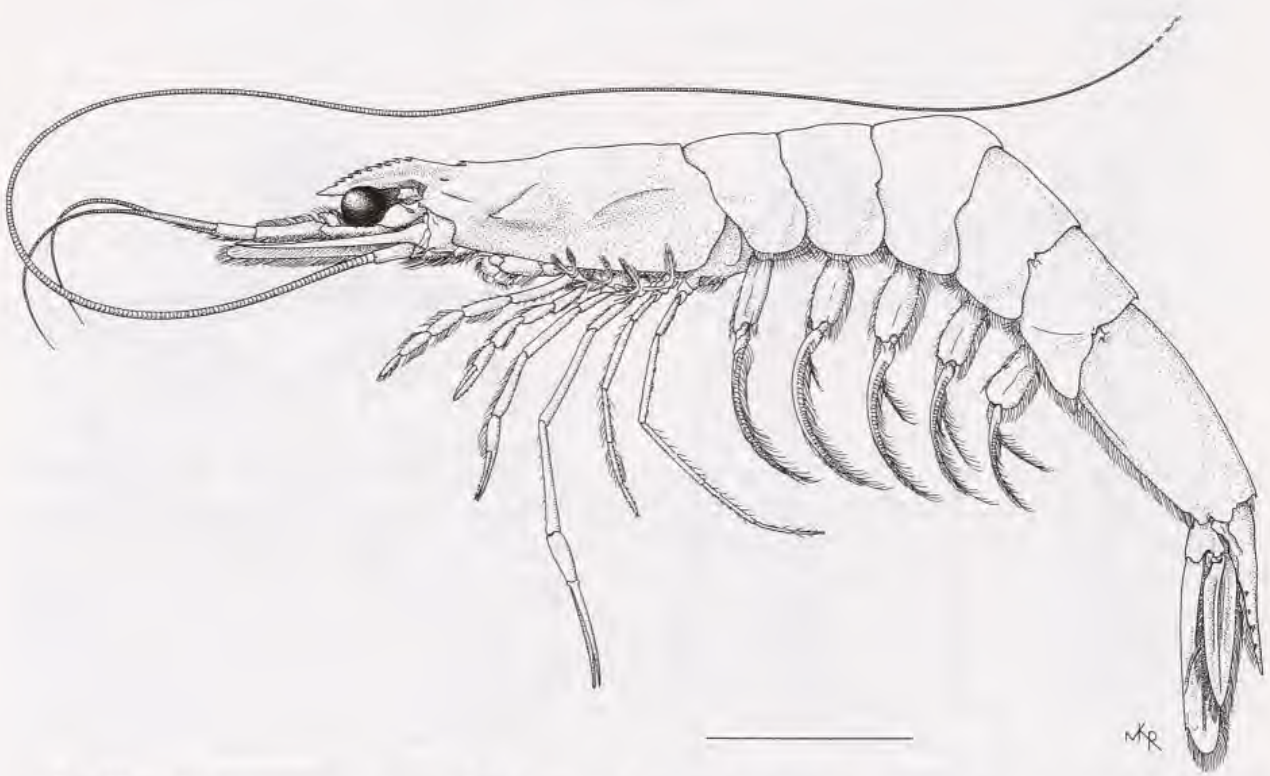


FIG. 50. — *Macropetasma africana*, ♀ 10.5 mm cl, Durban, South Africa. Lateral view. Scale = 10 mm.

Source : MNHN, Paris

TYPE SPECIES: By monotypy, *Parapeneus africanus* Balss, 1913b, in SCHULTZE, Forschungsreise Südafr., 5(2), Jena Denkschr., 17: 105.

TYPE LOCALITY: Swakopmund, Namibia.

GENDER: Neuter.

DIAGNOSIS. — Integument minutely and sparsely setose. Opaque-spot photophores present on abdomen. Rostrum armed with dorsal teeth only, in male short, reaching at most, to distal margin of first antennular segment, in female extending to mid-length of third segment; epigastric tooth distinctly separated from first rostral tooth. Carapace lacking orbital spine, with small antennal spine (subjacent margin usually produced into small projection), and well developed hepatic spine; pterygostomian and branchiostegal spines absent; postrostral carina lacking; postocular sulcus well defined, antennal carina, gastrofrontal and orbito-antennal sulci lacking, cervical sulcus well marked but short, hepatic sulcus horizontal, shallow, not marked anterior to hepatic spine; hepatic carina lacking; branchiocardiac carina feeble, sometimes indistinct; longitudinal and transverse sutures absent. Third abdominal somite expanded in caridean humpback fashion; sixth somite lacking cicatrices; photophores on abdominal somites, telson, uropods, and pleopod segments, their presence unique within the family. Telson armed with four pairs of movable lateral spines.

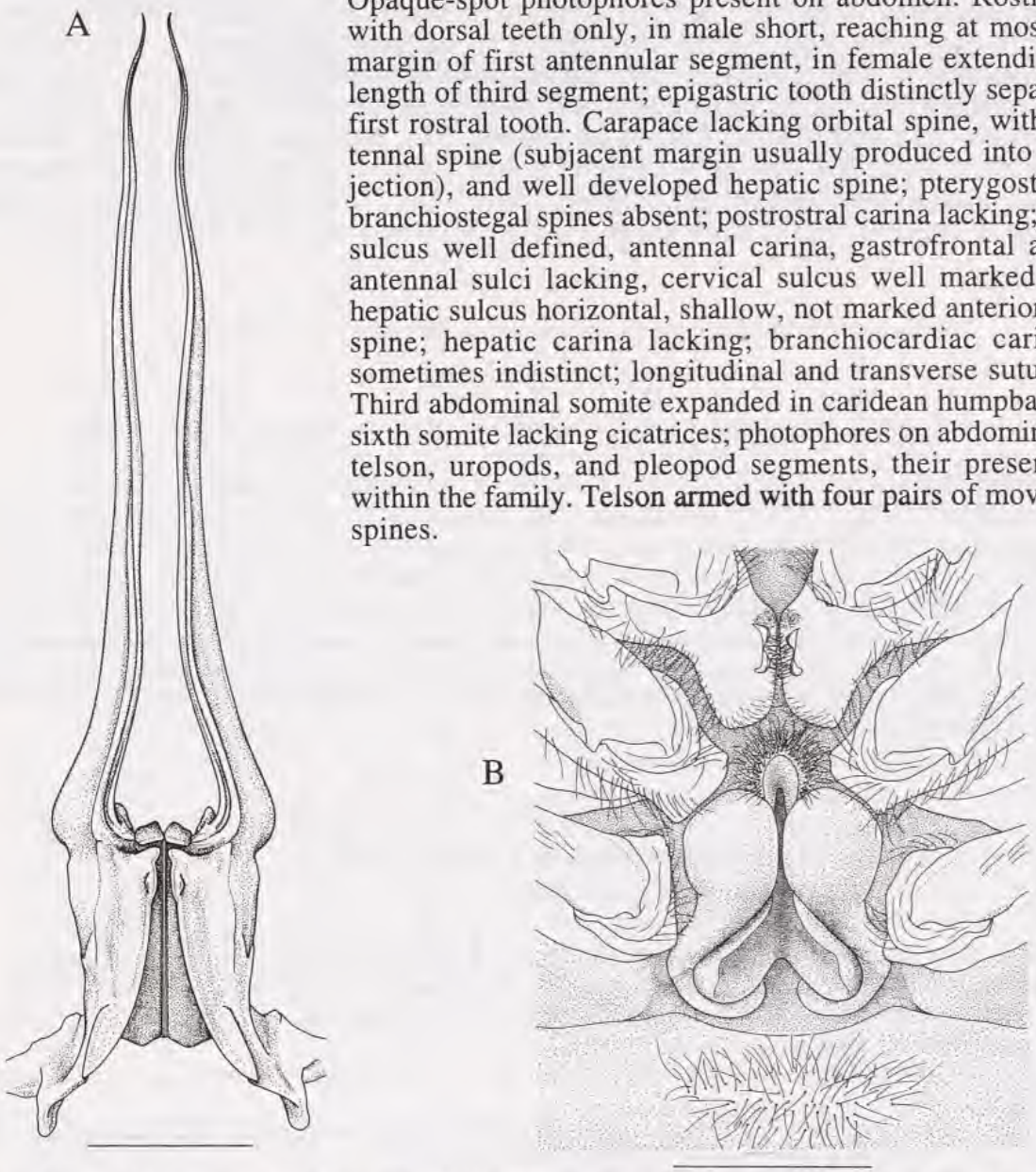


FIG. 51. — *Macropetasma africana*: **A**, ♂ 9.5 mm cl, off Great Fish Point, South Africa. Petasma, ventral view. — **B**, ♀ 10.5 mm cl, off Great Fish Point, South Africa. Thelycum. Scales = 1 mm.

Antennule lacking parapenaeid spine; antennular flagella subequal in length, long, longer than carapace, sexually dimorphic: in males, mesial flagellum depressed and bearing broad tooth

Source : MNHN, Paris

proximally on mesial margin. Palp of first maxilla entire, short, without proximolateral lobule, with broad setose proximomesial and minute distomesial lobules. In females, first and second pereopods lacking coxal, basial, and ischial spines; in males, second pereopod with coxal ridge on mesial margin, and very small, proximally situated tooth on ischium, third pereopod with coxa flattened, bearing blunt tooth on mesial margin, and small backwardly-directed proximal tubercle on ischium.

Petasma (articulated close to proximal extremity of basis of endopod instead of more distally as in other members of family) symmetrical, semiclosed, with lateral lobes uniquely produced into extremely long, basally expanded then filamentous processes; dorsomedian lobules terminating in well developed but relatively short distomedian projections. Appendix masculina roughly bell-shaped; endopod much reduced. Male genital openings subcoxal. Thelycum open, with paired lateral plates on sternite XIV sinuous, expanded into fleshy, bulbous swelling anteriorly and forming narrow arcs flanking deep bowl-like depression posteriorly; median protuberance on sternite XIII small, suboval to inverted heart-shaped, slightly concave, with narrow posteromedian groove continuous with depression of sternite XIV.

Distribution of branchiae, epipods, and exopods in the genus *Macropetasma*.

Somite	VII (Mxp1)	VIII (Mxp2)	IX (Mxp3)	X (P1)	XI (P2)	XII (P3)	XIII (P4)	XIV (P5)
Pleurobranchiae	-	-	1	1	1	1	-	-
Arthrobranchiae	-	1	2	2	2	2	1	-
Podobranchiae	-	1	-	-	-	-	-	-
Epipods	1	1	-	1	1	1	-	-
Exopods	1	-	-	1	-	-	-	-

SPECIES. — *Macropetasma africana* (Balss, 1913b). Kunene River mouth, northern Namibia, to Zululand, South Africa.

Genus ***Marsupenaeus*** Tirmizi, 1971

Figures 52-54

Peneus - ALCOCK, 1905, Ann. Mag. nat. Hist., (7)16: 513 [part]; 1906, Cat. Indian Dec. Crust., 3(1): 7 [part].

Penaeus - DE MAN, 1911, Siboga Exped., 39a: 95 [part]. — BURKENROAD, 1934b, Bull. Am. Mus. nat. Hist., 68(2): 74 [part]. — KUBO, 1949, J. Tokyo Coll. Fish., 36(1): 268, 270A [part]. — DALL, 1957, Aust. J. mar. Freshwat. Res., 8(2): 141 [part].

Penaeus (Melicertus) - PÉREZ FARFANTE, 1969. Fish. Bull., U. S., 67(3): 466 [part]. — BURUKOVSKY, 1972, Trudy AtlantNIRO, 42: 5, 8, 17.

Penaeus (Marsupenaeus) Tirmizi, 1971, Pakist. J. Zool., 2(2): 193. — LIU and ZHONG, 1988, Penaeoid Shr. S. China Sea, : 105. — HAYASHI, 1992, Dendr. Crust. Jap. Waters, : 298.

TYPE SPECIES: By monotypy, *Penaeus canaliculatus* var. *japonicus* Bate, 1888, Rep. scient. Results Voy. Challenger, 24: 245.

TYPE LOCALITY: Japan.

GENDER: Masculine.

Source : MNHN, Paris

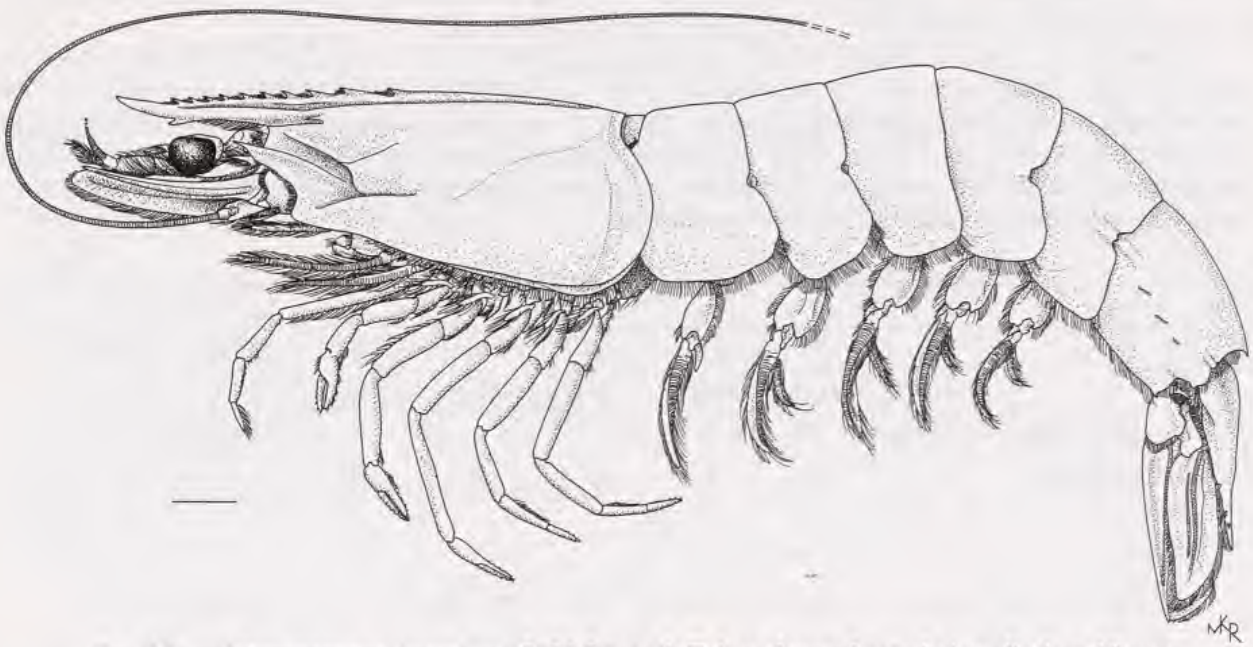


FIG. 52. — *Marsupenaeus japonicus*, ♀ 56.5 mm cl, Tokyo, Japan. Lateral view. Scale = 10 mm.

DIAGNOSIS. — Integument glabrous. Rostrum armed with dorsal and 1 (occasionally 2) ventral teeth, long in young, conspicuously surpassing antennular peduncle, decreasing in length with size, in adult reaching as little as distal end of first antennular segment. Carapace with spiniform orbital angle; antennal and hepatic spines very pronounced, lacking pterygostomian spine; postocular sulcus absent; postrostral carina and adrostral sulcus and carina long, almost reaching posterior margin of carapace; gastrofrontal carina turning anterodorsally upon itself at posterior end, short ramus projecting from base conspicuously separated from carina, gastrofrontal sulcus markedly bifid posteriorly; gastro-orbital carina long, almost reaching anterior margin of carapace; orbito-antennal sulcus well defined; cervical carina sharp, accompanying sulcus well marked; hepatic carina and sulcus well marked; branchiocardiac carina lacking; longitudinal and transverse sutures absent. Sixth abdominal somite bearing three cicatrices, lacking dorsolateral sulcus. Telson armed with three pairs of movable lateral spines.

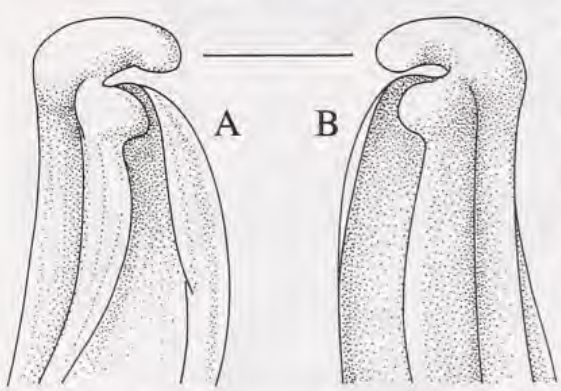


FIG. 53. — *Marsupenaeus japonicus*, ♂ 45 mm cl, Indian Ocean. Petasma. **A**, Distal part of right side, dorsolateral view. **B**, Distal part of right side, ventrolateral view. Scale = 1 mm.

Antennule lacking parapenaeid spine; antennular flagella much shorter than carapace. Palp of first maxilla elongate, usually triarticulate, sometimes consisting of 4 or 5 articles, basal article produced into setose proximal lobule on lateral and mesial margins, bearing one mesial spine and distolateral row of spinules. Basial spines on first and second pereopods.

Petasma symmetrical, semiclosed, with distomedian projections greatly developed and curved, forming hood. Appendix masculina subelliptical, armed with strong marginal spines and broad patch of short strong ones. Thelycum closed, with single plate on sternite XIV infolded laterally forming anteriorly open pocket, latter

Source : MNHN, Paris

functioning as seminal receptacle; sternite XIII bearing elongate platelike median protuberance extending well into sternite XIV.

HUDINAGA (1942) and TIRMIZI (1958) gave a detailed account of the structure of the thelycum and seminal receptacle of the monotypic *M. japonicus*, and included a study of the spermatophore, the latter consisting of sperm sac and, when deposited on female, an unique large subtriangular process or "wing", with anteriorly disposed broad base which, together with long posteriorly curved dorsal rod, anchors spermatophore to pocket. MEDINA *et al.* (1994) reported on the spermatozoal ultrastructure in *M. japonicus*.

Distribution of branchiae, epipods, and exopods in the genus *Marsupenaeus*.

Somite	VII (Mxp1)	VIII (Mxp2)	IX (Mxp3)	X (P1)	XI (P2)	XII (P3)	XIII (P4)	XIV (P5)
Pleurobranchiae	-	-	1	1	1	1	1	1
Arthrobranchiae	r	2	2	2	2	2	1	-
Podobranchiae	-	1	-	-	-	-	-	-
Epipods	1	1	1	1	1	1	-	-
Exopods	1	1	1	1	1	1	1	1

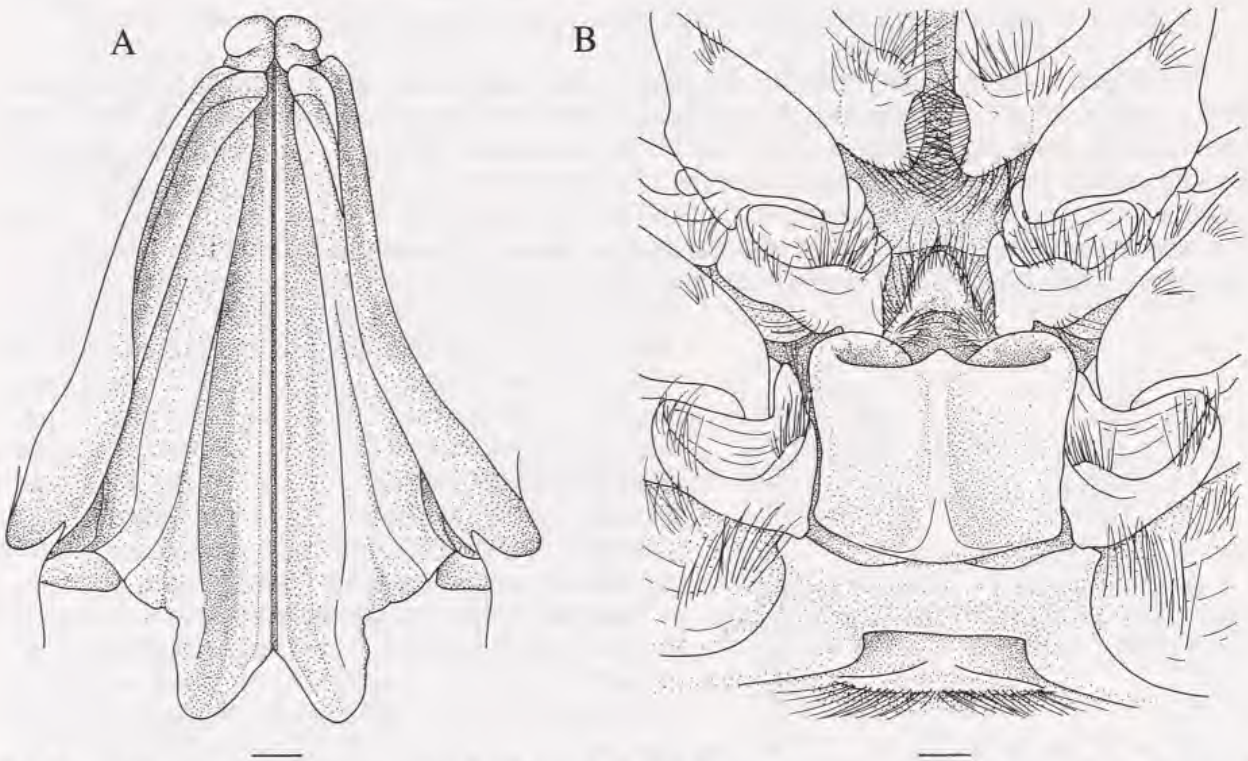


FIG. 54. — *Marsupenaeus japonicus*: **A**, ♂ 45 mm cl, Indian Ocean. Petasma, ventral view. — **B**, ♀ 42 mm cl, Tokyo, Japan. Thelycum. Scales = 1 mm.

SPECIES. — *Marsupenaeus japonicus* (Bate, 1888). Eastern Mediterranean; East coast of South Africa; East Africa; Madagascar; Mauritius; Réunion; Red Sea; Persian Gulf; India; Malaysia; Singapore; Thailand; Indonesia; South China Sea; Philippines; Taiwan; Korea; Japan; New Guinea; Northern Territory, Queensland, Australia; Fiji.

Source : MNHN, Paris

Genus *Megokris* new genus

Figures 55-58

Penaeus - HASWELL, 1879, Proc. Linn. Soc. N.S.W., 4: 38 [part, description of *Penaeus granulosus* only].
Peneus (Trachypeneus) - ALCOCK, 1901, Descr. Cat. Indian Deep-Sea Crust., : 15.
Trachypeneus - ALCOCK, 1905, Ann. Mag. nat. Hist., (7)16: 522 [part]. — SCHMITT, 1926, Zool. (biol.) Results Fish. Exp. 'Endeavour', 5(6): 348 [description of *P. granulosus* only]. — BURKENROAD, 1983, Crust. Issues, 1: 283 [part].
Trachypenaeus - DE MAN, 1911, Siboga Exped., 39a: 87 [part]. — KUBO, 1949, J. Tokyo Fish., 36(1): 391 [part]. — DALL, 1957, Aust. J. mar. Freshwat. Res., 8(2): 202 [part]. — RACEK and DALL, 1965, Verh. K. Akad. Wet. Nat., 56: 87 [part]. — RACEK and YALDWYN, 1971, Proc. Linn. Soc. N.S.W., 95(3): 213. — MOTOH and BURI, 1984, Res. Crust., (13-14): 80. — LIU and ZHONG, 1988, Penaeoid Shr. S. Ch. Sea, : 184 [part]. — DALL *et al.*, 1990, Adv. Mar. Biol., 27: 102 [part].
Trachypeneus (Trachypeneus) - BURKENROAD, 1934a [September], Bull. Bingham oceanogr. Coll., 4(7): 49 [Division II (part)].
Trachypeneus - BURKENROAD, 1934b [December], Bull. Am. Mus. nat. Hist., 68(2): 94 [Division 2 (part)].

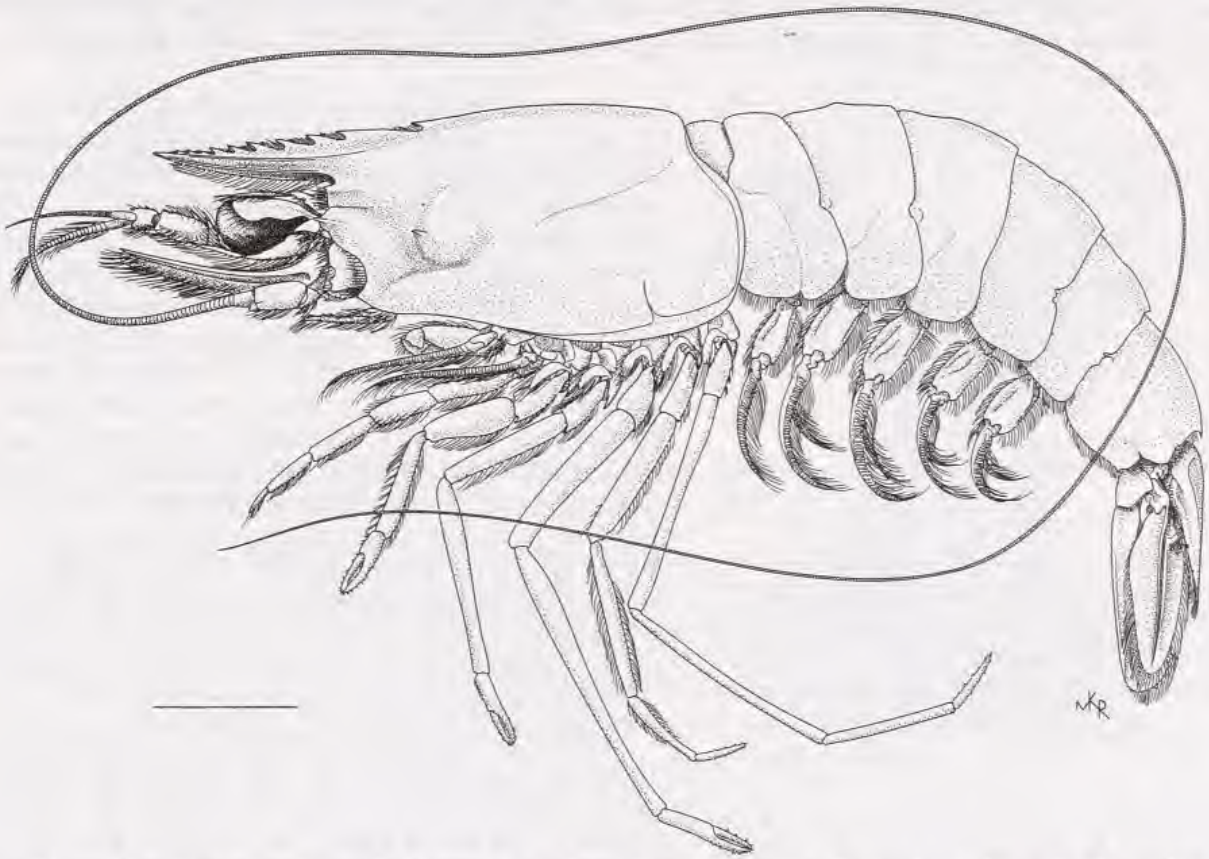


FIG. 55. — *Megokris granulosus*, ♀ 26 mm cl, north-northeast of Bowen, Queensland, Australia. Lateral view. Scale = 10 mm.

TYPE SPECIES: By present designation, *Penaeus granulosus* Haswell, 1879, Proc. Linn. Soc. N.S.W., 4: 41.

TYPE LOCALITY: Australia, Darney Island, Torres Strait.

GENDER: Masculine.

Source : MNHN, Paris

ETYMOLOGY. — From the Greek *'mega'* - large, and *'okris'* - a projection, alluding to the extraordinary posterior extension of the median protuberance of sternite XIII.

DIAGNOSIS. — Body thickset. Integument thick, densely pubescent. Rostrum short, reaching between distal margin of first antennular segment and about end of peduncle; armed with dorsal teeth only; epigastric tooth distinctly separated from first rostral. Carapace with orbital angle sharp or armed with small spine; antennal and hepatic spines present; pterygostomian angle blunt or acute; postocular sulcus shallow or obsolete; gastro-orbital carina lacking; orbito-antennal sulcus feeble or lacking; cervical sulcus short; hepatic sulcus extending just ventral to hepatic region or farther anteroventrally; branchiocardiac carina usually absent, occasionally clearly distinct; longitudinal suture short, ending well anterior to hepatic spine; transverse suture usually clearly distinct. Abdomen with sixth somite lacking cicatrix. Telson with 3 pairs of movable lateral spines.

Antennule lacking parapenaeid spine; antennular flagella shorter than carapace. Palp of first maxilla entire, distally tapering to acute apex, produced into small setose proximolateral, broad, setose proximomesial and small acute distomesial lobules, latter bearing 1-3 sharp spines and armed with distoventral row of spinules. Fourth and fifth pereopods with dactyl neither elongate nor subdivided. Basial spine lacking on third maxilliped, present on first and second pereopods; small ischial spine on first pereopod, lacking on second. Epipod on first to third pereopods[2], or on third only.

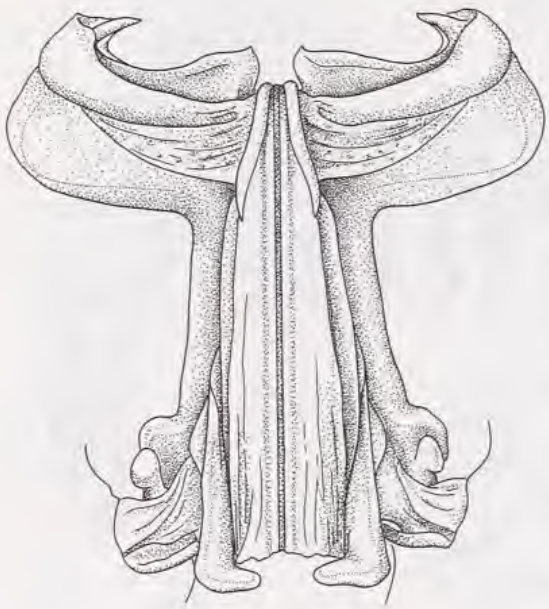


FIG. 56. — *Megokris granulosus*, ♂ 11 mm cl, Manifa, Saudi Arabia. Petasma, dorsal view. Scale = 1 mm.

Petasma symmetrical, semiclosed, variable in shape, with lateral lobes distolaterally produced into either moderately broad to narrow, roughly hornlike projections extending laterally and with hook-like tips curving distally or distomesially, or extremely broad basally but narrowing rapidly, ending in distally directed tips. Appendix masculina subquadrangular with rounded corners. Thelycum closed, with plate of sternite XIV deeply excavate anteriorly, extremely short posteromedially, expanding laterally, flanking strikingly large, sometimes tongue-like, caudal extension of median protuberance; mesial margins of plate in contact with, or narrowly separated from protuberance, or forming narrow flaps; anterior sternal invagination (other than seminal receptacles) lacking, thus neither transverse groove nor median pocket present; median protuberance uniquely extending caudally for almost entire length of sternite XIV.

Seminal receptacles consisting of paired bilobed sacs, large posterior lobe and small anterolateral one, with strongly curved slitlike opening lying on anteromesial side of large lobe, joining cavity dorsal to and at about midlength of median protuberance, near base of fourth pereopod.

[2]A few specimens of *M. gonospinifer* were found to lack an epipod on the third pereopod (RACEK and DALL, 1965; RACEK and YALDWYN, 1971); further studies of the species are needed to determine the significance of these observations.

Source : MNHN, Paris

Distribution of branchiae, epipods, and exopods in the genus *Megokris*.

Somite	VII (Mxp1)	VIII (Mxp2)	IX (Mxp3)	X (P1)	XI (P2)	XII (P3)	XIII (P4)	XIV (P5)
Pleurobranchiae	-	-	1	1	1	1	-	-
Arthrobranchiae	r	2	2	2	2	2	1	-
Podobranchiae	-	1	-	-	-	-	-	-
Epipods	1	1	-	1 (-)	1 (-)	1	-	-
Exopods	1	1	1	1	1	1	1	1

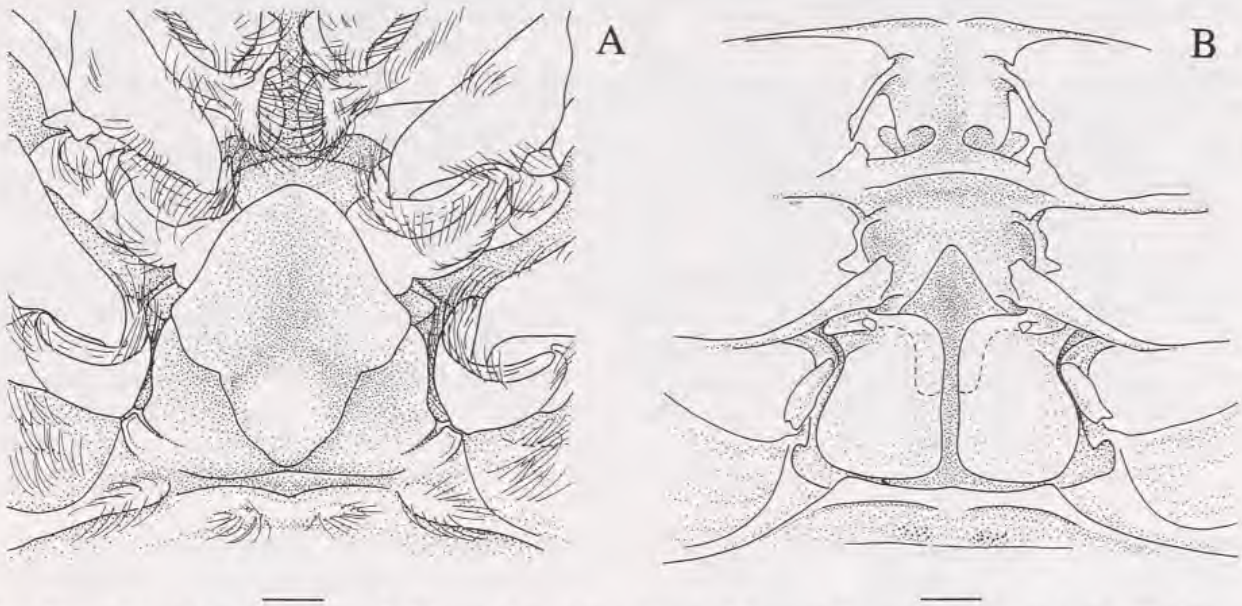


FIG. 57. — *Megokris granulosus*, ♀ 25 mm cl, north-northeast of Bowen, Queensland, Australia: **A**, Thelycum. **B**, Seminal receptacles, dorsal view. Scales = 1 mm.

REMARKS. — BURKENROAD (1934a) divided *Trachypenaeus* in two subgenera: *Trachysalambria*, "Division I", proposed by him, possessing an epipod on the first and second pereopods and a pair of seminal receptacles opening mesially in an unpaired pocket into which sperm-free male secretion is received; and *Trachypenaeus* s.s., "Division II", lacking an epipod on the first and second pereopods and, apparently, a median pocket. Furthermore, BURKENROAD (1934a, b) subdivided Division I, *Trachysalambria*, into two sections: Section 1, possessing a longitudinal suture extending behind the hepatic spine, basial spine on the third maxilliped, lacking an ischial spine on the first pereopod, and having the posterior lip of the transverse groove anterodorsal to the plate of sternite XIV, from which the median pocket is invaginated, produced in a pair of free flaps; and Section 2, exhibiting a longitudinal suture not extending behind the hepatic spine, lacking basial spine on the third maxilliped, possessing an ischial spine on the first pereopod and the posterior lip of the transverse groove not produced as paired flaps. The characters of these Divisions and Sections, cited by BURKENROAD in 1934a, appeared in another paper of his (1934b) only three months after the former was published.

Later, it was noticed by various authors (KUBO, 1949; DALL, 1957; BURKENROAD, 1959) that epipods on the first and second pereopods were also absent in some members of *Trachysalambria*, Section 2, and, consequently, this taxon was not accepted. KUBO (1949)

Source : MNHN, Paris

rejected those subgenera but, as BURKENROAD (1959) noted, for erroneous reasons: he mistook Section 2 of Division I for Division II. BURKENROAD (1934a) selected *T. (Trachysalambria) curvirostris* as the type of this subgenus, including it in his Section 2 of Division I; in 1934b, he further characterized Section 2.

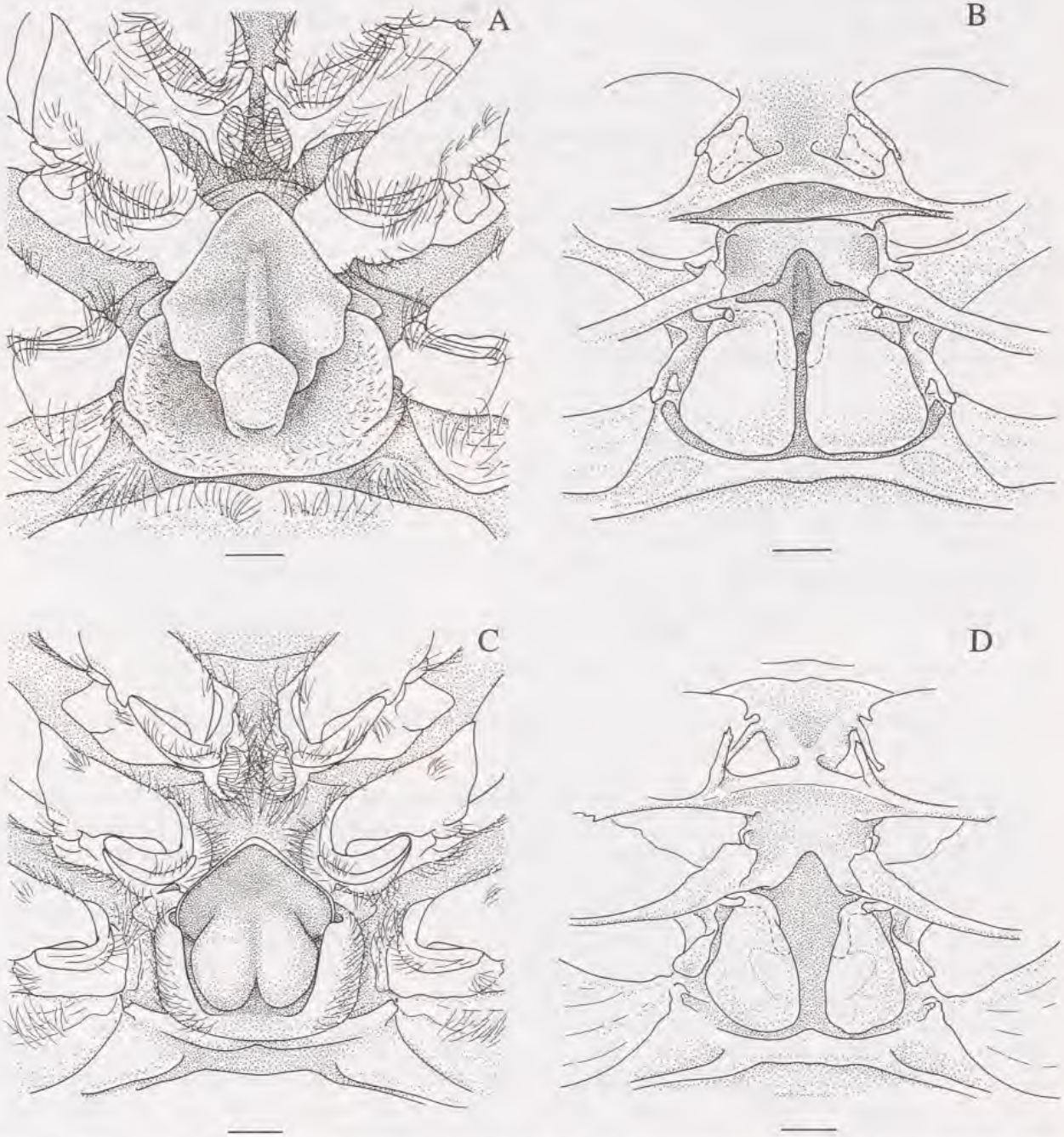


FIG. 58 A-B. — *Megokris pescadoreensis*, ♀ 23.5 mm cl, 11 km north of Corregidor Island, Manila Bay, Philippines: **A**, Thelycum. **B**, Seminal receptacles, dorsal view. Scales = 1 mm.

FIG. 58 C-D. — *Megokris sedili*, ♀ 23 mm cl, Chinde, Zambezia, Mozambique: **C**, Thelycum. **D**, Seminal receptacles, dorsal view. Scales = 1 mm.

Source : MNHN, Paris

As a result of a detailed study of *Trachypenaeus* s.l., we are of the opinion that in this extremely heterogeneous group, four different genera should be recognized. They can be separated mainly by the structures of the genitalia, particularly those of the thelycum. One of them (*Rimapenaeus*, proposed herein) can be distinguished also by the length of the longitudinal suture of the carapace which is long rather than short, by the presence of a basial spine on the third maxilliped, and by possessing a trilobed, instead of a bilobed, seminal receptacle. The occurrence of an epipod on the first and second pereopods varies in *Megokris* and *Trachysalambria* but seems to be constant in *Rimapenaeus* and is lacking in the monotypic *Trachypenaeus*, s.s. Finally, in two genera, *Megokris* and *Trachypenaeus*, the seminal receptacles open independently, with no connecting sternal groove or median pocket. In *Trachysalambria*, however, they open into a common transverse groove (from which they actually originate) and in *Rimapenaeus* they open mesially into a common median pocket. The four genera are discussed below; their diagnoses may be found under the relevant generic headings.

Megokris comprises one of the species groups previously included in *Trachypenaeus*, and constitutes part of BURKENROAD's (1934a) Division II. Although it most closely resembles the latter genus, as restricted herein, it differs in that the thelycal plate of sternite XIV is deeply excavate, its posteromedian part is extremely short, and extends anterolaterally embracing the typical caudal projection of the median protuberance. In contrast, in the species of *Trachypenaeus* s.s., the plate of sternite XIV is moderately long medially and the median protuberance is short, not invading the plate. Furthermore, in *Megokris*, the distolateral projections of the petasma are either moderately broad to narrow and extend laterally or they are extremely broad basally, narrowing rapidly, all ending in small hooklike tips; the distolateral projections in *Trachypenaeus* are extremely broad throughout their length and end in an elongate flattened and twisted narrow process directed almost straight forward. In both these genera the only sternal invaginations are those giving rise to the seminal receptacles, thus these are neither connected by a transverse groove, as they do in *Trachysalambria*, nor by a median pocket as they are in *Rimapenaeus*.

SPECIES. — *Megokris gonospinifer* (Racek and Dall, 1965). Arafura Sea; west Irian Jaya, Indonesia; Papua New Guinea; Northern Territory, Australia.

Megokris granulosus (Haswell, 1879). Saudi Arabia; Persian Gulf; Pakistan; South India; Sri Lanka; Malaysia; Indonesia; Philippines; Taiwan; New Guinea; Queensland, Australia.

Megokris pescadoreensis (Schmitt, 1931). Persian Gulf; Malaysia; Singapore; China; Philippines; Hong Kong; Taiwan.

Megokris sedili (Hall, 1961). Mozambique; India; Sri Lanka; Myanmar; Singapore; Straits of Malacca; Gulf of Thailand; Gulf of Tonkin; South China Sea.

Genus ***Melicertus*** Rafinesque-Schmaltz, 1814

Figures 59-60

Cancer - FORSKÅL, 1775, Descr. Anim., : 95 [part].

Melicertus Rafinesque-Schmaltz, 1814, Préc. Découv. Trav. Somiol., :22.

Penaeus - H. MILNE EDWARDS, 1837, Hist. Nat. Crust., 2: 414. — DE MAN, 1911, Siboga Exped., 39a: 95 [part]. — BURKENROAD, 1934b, Bull. Amer. Mus. nat. Hist., 68(2): 74 [part]. — KUBO, 1949, J. Tokyo Coll. Fish., 36(1): 268 [part]. — DALL, 1957, Aust. J. mar. Freshwat. Res., 8(2): 141 [part].

Peneus - ALCOCK, 1901, Descr. Cat. Indian Deep-Sea Crust., : 13 [part]; 1905, Ann. Mag. nat. Hist., (7)16: 513 [part]; 1906, Cat. Indian Dec. Crust., 3(1): 7 [part].

Salambria "Burkenroad" Balss, 1957, Bronn's Kl. Ordn. Tierreichs, 7(1)12: 1518 [nomen nudum].

Source : MNHN, Paris

Penaeus (Melicertus) - PÉREZ FARFANTE, 1969, Fish. Bull., U. S., 67(3): 466 [part]. — BURUKOVSKY, 1972, Trudy AtlantNIRO, 42: 6, 10, 14, 17. — LIU and ZHONG, 1988, Penaeoid Shr. S. China Sea, : 105. — HAYASHI, 1992, Dendr. Crust. Japan. Waters, : 122.

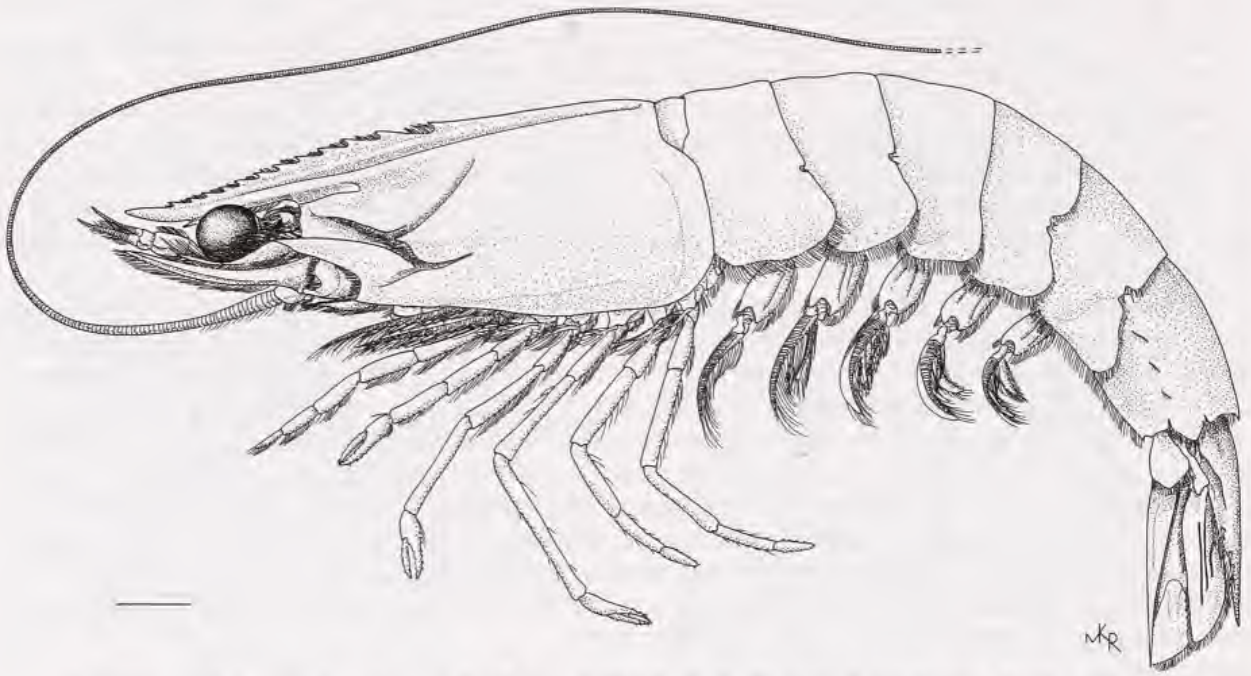


FIG. 59. — *Melicertus kerathurus*, ♀ 47 mm cl, El Maghreb, Tunisia. Lateral view. Scale = 10 mm.

TYPE SPECIES: By monotypy, *Melicertus tigrinus* Rafinesque-Schmaltz, 1814: 22 (= *Cancer kerathurus* Forskål, 1775).

TYPE LOCALITY: Sicily.

GENDER: Masculine.

DIAGNOSIS. — Integument glabrous. Rostrum with dorsal and usually 1 ventral tooth (bearing 2 or 3 only in *M. marginatus*). Carapace with well marked orbital angle; antennal and hepatic spines strong, lacking pterygostomian spine; postocular sulcus absent; postrostral carina and adrostral carina and sulcus long, extending considerably beyond epigastric tooth, almost always nearly to posterior margin of carapace; gastrofrontal carina turning anterodorsally upon itself at posterior end, and with short ramus projecting anteriorly from base ventrally close to carina; gastro-frontal sulcus not distinctly bifid posteriorly; gastro-orbital carina long, at least three-quarters of distance between hepatic spine and orbital margin; orbito-antennal sulcus well marked; cervical carina sharp, accompanying sulcus deep; hepatic carina and sulcus well marked; branchiocardiac carina lacking; longitudinal and transverse sutures absent. Sixth abdominal somite bearing three cicatrices, lacking dorsolateral sulcus. Telson usually armed with two or three pairs of lateral movable spines (absent only in *M. canaliculatus*).

Antennule lacking parapenaeid spine; antennular flagella much shorter than carapace. Palp of first maxilla elongate, consisting of 3 or 4 articles, distal ones together flagelliform; large basal article produced in setose lateral and mesial lobules proximally, bearing 1 long, subdistal spine and distolateral row of spinules. Basial spine on first and second pereopods reduced, ischial spine occasionally present on first.

Source : MNHN, Paris

Petasma symmetrical, semiclosed, with distomedian projections short to moderately long; ventral costae long, gently to strongly curved distally. Appendix masculina subelliptical, armed with numerous marginal setae and, usually, broad distal patch. Thelycum closed, with paired lateral plates on sternite XIV shielding simple median saclike seminal receptacle; median protuberance on sternite XIII well developed. Spermatophores quite similar to those of *Farfantepenaeus* species.

Observations on the structure of the spermatophore of *Melicertus kerathurus* were made by HELDT (1938a, b), under the name *Penaeus trisulcatus*, while MALEK and BAWAB (1974a, b), under *P. kerathurus*, studied its formation in detail. The spermatozoal ultrastructure of *M. kerathurus* was reported by MEDINA *et al.*, 1994.

Distribution of branchiae, epipods, and exopods in the genus *Melicertus*.

Somite	VII (Mxp1)	VIII (Mxp2)	IX (Mxp3)	X (P1)	XI (P2)	XII (P3)	XIII (P4)	XIV (P5)
Pleurobranchiae	-	-	1	1	1	1	1	1
Arthrobranchiae	r	2	2	2	2	2	1	-
Podobranchiae	-	1	-	-	-	-	-	-
Epipods	1	1	1	1	1	1	-	-
Exopods	1	1	1	1	1	1	1	1

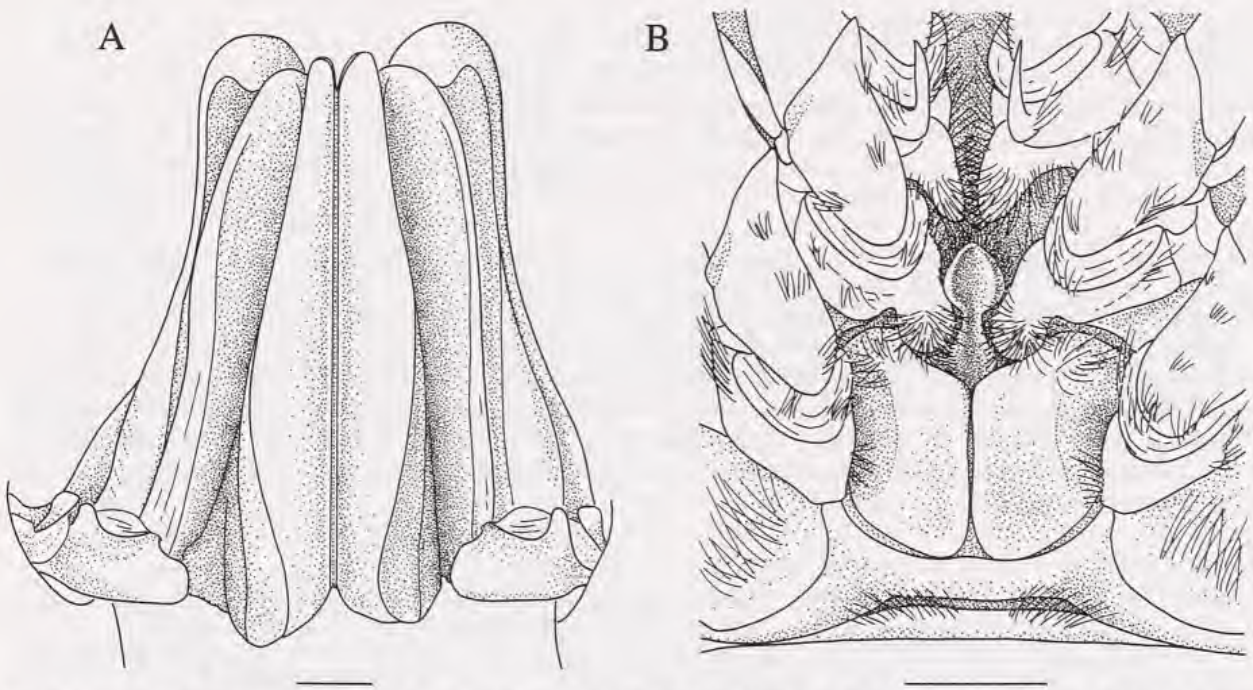


FIG. 60. — *Melicertus kerathurus*: **A**, ♂ 44 mm cl, El Maghreb, Tunisia. Petasma, dorsal view. Scale = 1 mm. — **B**, ♀ 47 mm cl, El Maghreb, Tunisia. Thelycum. Scale = 5 mm.

SPECIES. — *Melicertus canaliculatus* (Olivier, 1811). East coast of South Africa to Red Sea; Madagascar; Mauritius; Réunion; Gulf of Oman; India; Sri Lanka; Bangladesh; Malaysia; Indonesia; Thailand; South China Sea; Philippines; Taiwan; Japan; New Guinea; Northern Queensland, Australia; Loyalty Islands; Fiji.

Source : MNHN, Paris

Melicertus hathor Burkenroad, 1959. South-east coast of Africa to Red Sea; Madagascar; Mauritius; Réunion; Seychelles; Persian Gulf; Gulf of Oman; Pakistan; South India; Sri Lanka; Myanmar.

Melicertus kerathurus (Forskål, 1775). Mediterranean; eastern Atlantic Ocean from southern England to Angola.

Melicertus latisulcatus (Kishinouye, 1896). Singapore; Malaysia; Thailand; Indonesia; South China Sea; Philippines; Japan; Hong Kong; Korea; New Guinea; Western Australia, Northern Territory to New South Wales, Australia; Fiji.

Melicertus longistylus (Kubo, 1943). Malaysia; Thailand; Singapore; South China Sea; Philippines; Taiwan; Japan; Western Australia, Northern Territory, Queensland, New South Wales, Australia.

Melicertus marginatus (Randall, 1840). East Africa; Madagascar; Arabian Sea; Bay of Bengal; Singapore; Indonesia; Taiwan; South China Sea; Japan; Queensland and Western Australia, Australia; Hawaii.

Melicertus plebejus (Hess, 1865). Southern Queensland to Victoria, Australia.

Genus ***Metapenaeopsis*** Bouvier, 1905

Figures 61-62

Penoeus - De Haan, 1844, Fauna Jap. (Crust.), (6, 7): pl. 46, fig. 3-5 [part].

Penaeus - De Haan, 1849, Fauna Jap. (Crust.), (6): 190-193.

Parapenaeus - Smith, 1885b, Proc. U.S. natn. Mus., 8(11/12): 170 [part].

Metapenaeus - Wood-Mason, 1891, Ann. Mag. nat. Hist., (6)8: 271 [part].

Metapenaeopsis Bouvier, 1905a, C. r. hebd. Séanc. Acad. Sci., Paris, 140: 981. — Kubo, 1949, J. Tokyo Coll. Fish., 36(1): 408. — Dall, 1957, Aust. J. mar. Freshwat. Res., 8(2): 166. — Racek and Dall, 1965, Verh. K. Akad. Wet., 56(3): 17. — Pérez Farfante, 1971a, Smithson. Contrib. Zool., 79: 2. — Crosnier, 1987, Bull. Mus. Hist. nat. Paris, (4)9, sect. A (2): 409. — Dall *et al.*, 1990, Adv. Mar. Biol., 27: 71. — Crosnier, 1991, Mém. Mus. Hist. nat. Paris, (A)152: 155. — Hayashi, 1992, Dendr. Crust. Japan. Waters, : 79. — Crosnier, 1994a, Mém. Mus. Hist. nat. Paris, 161: 258.

Placed on the Official List of Generic Names in Zoology, International Commission on Zoological Nomenclature, 1969, Opinion 864, Name No. 1819, Bull. zool. Nom., 25(4/5): 139.

Archipenaeopsis Bouvier, 1905b, C. r. hebd. Séanc. Acad. Sci., Paris, 141: 747. Type species: By monotypy, *Archipenaeopsis vestitus* Bouvier, 1905b, C. r. hebd. Séanc. Acad. Sci., Paris, 141: 747 [= *Metapenaeopsis goodei* (Smith, 1885b)]. Type locality: "Mer des Antilles" [actually, NW of Dry Tortugas Islands, 24°43'N, 83°25'W], 68 m, *Blake* sta 11 [data from label accompanying holotype, Museum of Comparative Zoology, Harvard University, 7204].

Parapenaeopsis - Bouvier, 1905b, C. r. hebd. Séanc. Acad. Sci., Paris, 141: 748.

Metapeneus - Alcock, 1906, Cat. Indian Dec. Crust., 3(1): 16 [part].

Penaeopsis - Bouvier, 1908b, Bull. Inst. océanogr., Monaco, 119: 5 [part]. — Barnard, 1950, Ann. S. Afr. Mus., 38: 592. — Holthuis, 1952a, Résult. scient. Expéd. océanogr. belge (1948-1949), 3(2): 80.

Leptopenaeus Kishinouye, 1929, Proc. imp. Acad. Japan, 5(7): 282. Type species: By present designation, *Leptopenaeus philippinensis* (= *Penaeus philippii* Bate, 1881). Type locality: Philippines, 180 m.

Ceratopenaeus Kishinouye, 1929, Proc. imp. Acad. Japan, 5(7): 282. Type species: By present designation, *Ceratopenaeus mogiensis* (= *Parapenaeus mogiensis* Rathbun, 1902). Type locality: Japan.

Erythropenaeus Kishinouye, 1929, Proc. imp. Acad. Japan, 5(7): 283. Type species: By present designation, *Erythropenaeus akayebi* (= *Parapenaeus akayebi* Rathbun, 1902). Type locality: Japan.

[*Penaeopsis*] (*Metapenaeopsis*) - Burkenroad, 1934a, Bull. Bingham oceanogr. Coll., 4(7): 8.

Metapeneopsis - Burkenroad, 1983, Crust. Issues, 1: 282.

Source : MNHN, Paris

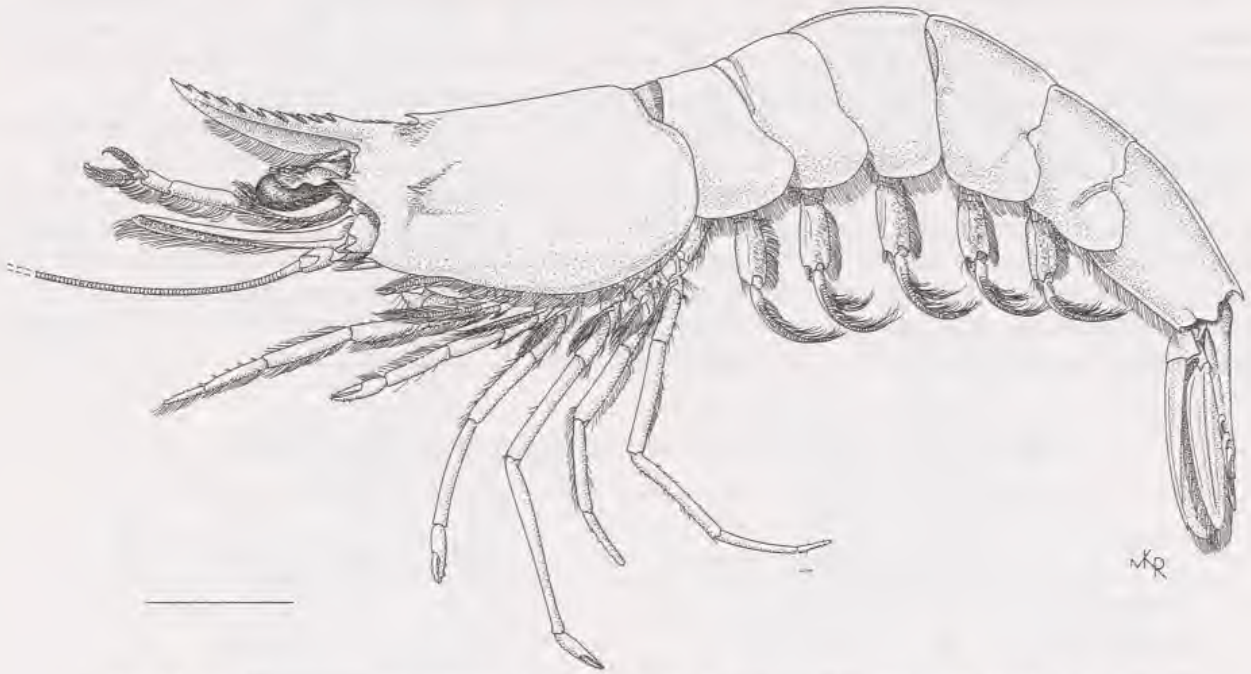


FIG. 61. — *Metapenaeopsis miersi*, ♀ 19 mm cl, off Mauritania. Lateral view. Scale = 10 mm.

TYPE SPECIES: By monotypy, *Metapenaeopsis pubescens* Bouvier, 1905a, C. r. hebd. Séanc. Acad. Sci., Paris, 140: 981 [not *Penaeus pubescens* Stimpson, 1871] = *Penaeopsis miersi* Holthuis, 1952a, Expéd. Océanogr. belge Eaux Côt. Afr. Atlant. S. (1948-49), 3(2): 80.

TYPE LOCALITY: Cape Verde Islands [Canal de St Vincent à St. Antoine, îles du Cap Vert, 16°06'N, 24°00'W, 137-165 m, *Talisman* sta. 115].

GENDER: Feminine.

DIAGNOSIS. — Integument thick, pubescent, usually densely so. Rostrum armed with dorsal teeth only; variable in length, usually not overreaching antennular peduncle; epigastric tooth conspicuously separated from first rostral tooth. Carapace with small orbital, and well developed antennal, pterygostomian, and hepatic, spines, lacking branchiostegal spine; postocular sulcus absent; orbito-antennal and cervical sulci usually feeble; hepatic sulcus usually weak, sometimes indistinct anteriorly, never reaching pterygostomian angle; hepatic carina indistinct; sutures lacking. Stridulating ridges on posterior parts of carapace present in some species. Sixth abdominal somite without cicatrices. Telson armed with pair of fixed subapical spines preceded by three pairs of conspicuous movable spines.

Antennule with parapenaeid spine, sometimes vestigial; antennular flagella variable in length, usually much shorter but sometimes longer than carapace; sexually dimorphic, longer in males than in females. Palp of first maxilla entire, short, often narrowing to blunt apex, bearing small proximolateral lobule, conspicuous proximomesial and smaller distomesial lobules, latter armed with 1-3 slender spines, and distolateral row of spinules. Basial spine on third maxilliped, first and second pereopods, always lacking on third. Rudimentary anterior arthrobranchia present on somite XIII.

Petasma asymmetrical, divided at about midlength into proximal and distal parts, latter complex, subdivided into several projections and components, one (in Atlantic, eastern Pacific and single Indo-West Pacific species) or two (in other Indo-west Pacific species) of these

Source : MNHN, Paris

lamellate distoventral projections, more or less covering others. Appendix masculina trumpet-shaped (small abrupt expansion of dorsomesial rib of endopod). Thelycum closed, with transverse plate on sternite XIV and strongly developed median protuberance on sternite XIII; sometimes intermediate plate present between latter and transverse plate on XIV.

Seminal receptacle not saclike, usually consisting of bulbous capsule situated dorsal to anterolateral part of sternite XIV (dorsal to thelycal hood), continuous with horizontal or obliquely directed narrow troughlike duct (fissure ventromesial), which sometimes turning anteriorly in U and extending for variable length along sternite XIII. Apparently, sperm enters through the duct fissure and flows into the capsule and exits through a slit (continuation of the duct fissure) on the anterodorsal side of the capsule, at the base of the fourth pereopod. The seminal receptacles of *M. goodei* and of various Western Atlantic species were described and illustrated by BURKENROAD (1934a) and PÉREZ FARFANTE (1971a), respectively.

Distribution of branchiae, epipods, and exopods in the genus *Metapenaeopsis*.*

Somite	VII (Mxp1)	VIII (Mxp2)	IX (Mxp3)	X (P1)	XI (P2)	XII (P3)	XIII (P4)	XIV (P5)
Pleurobranchiae	-	-	1	1	1	1	1	-
Arthrobranchiae	r	2	2	2	2	2	1+r	-
Podobranchiae	-	1	-	-	-	-	-	-
Epipods	1	1	-	1	1	1	-	-
Exopods	1	1	1	1	1	1	1	1

* CROSNIER (1991) has pointed out that this formula is found in most species of this genus, but that there are some exceptions in the number or development of the branchiae.

SPECIES. — *Metapenaeopsis acclivis* (Rathbun, 1902). Taiwan; Japan.

Metapenaeopsis aegyptia Galil and Golani, 1990. Eastern Mediterranean; Red Sea; Madagascar; Seychelles; Arabian Sea; Maldive Islands; Sri Lanka; Japan; Chesterfield Islands; New Caledonia.

Metapenaeopsis andamanensis (Wood-Mason, 1891). Southern India; Andaman Islands; Straits of Malacca; Malaysia; South China Sea; Taiwan; Japan.

Metapenaeopsis angusta Crosnier, 1987. Singapore; Vietnam; Brunei; Philippines.

Metapenaeopsis assimilis (De Man, 1920). Indonesia; New Guinea.

Metapenaeopsis barbata (De Haan, 1844). Persian Gulf; Bay of Bengal; Malaysia; Indonesia; Taiwan; Japan.

Metapenaeopsis beebei (Burkenroad, 1938). Western Baja California Sur, Gulf of California to Michoacán, Mexico; Costa Rica; Gulf of Panama; Galapagos Islands.

Metapenaeopsis ceylonica Starobogatov, 1972. Natal, South Africa; Mozambique; Madagascar; India; Maldive Islands; Sri Lanka; Indonesia; Philippines; Taiwan; New Guinea; New Caledonia.

Metapenaeopsis commensalis Borradaile, 1898. Maldive Islands; Laccadive Islands; Indonesia; Philippines; Taiwan; northwestern Australia; Torres Strait; New Caledonia; Ellice Islands.

Source : MNHN, Paris

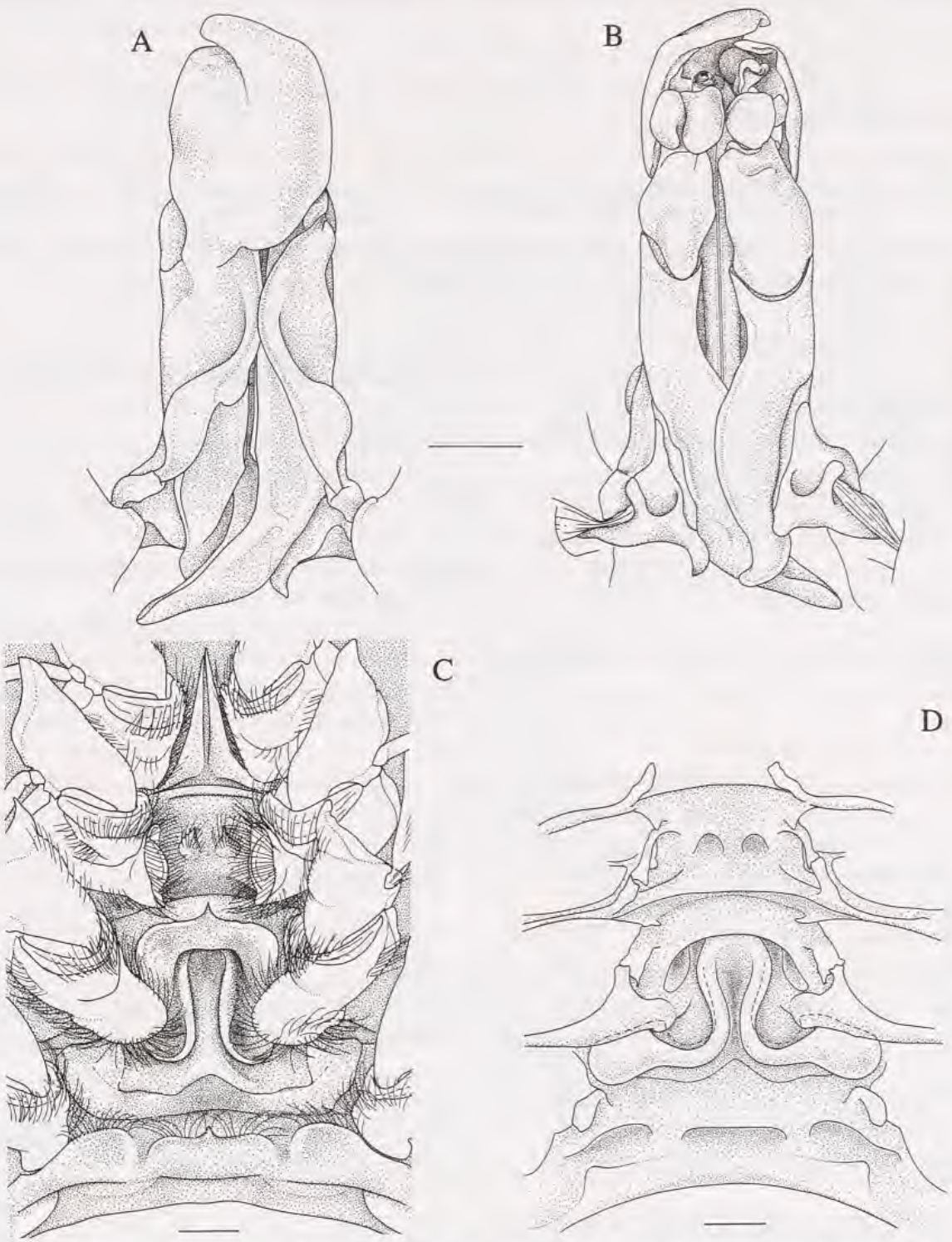


FIG. 62. — *Metapenaeopsis miersi*: **A-B**, ♂ 12.5 mm cl, off Mauritania. **A**, Petasma, ventral view. **B**, Petasma, dorsal view. — **C**, ♀ 19 mm cl, off Mauritania. Thelycum. — **D**, ♀ 17.5 mm cl, Ivory Coast. Seminal receptacles, dorsal view. Scales = 1 mm.

Source : MNHN, Paris

Metapenaeopsis coniger (Wood-Mason, 1891). Gulf of Aden; Gulf of Oman; India; Bay of Bengal; Japan.

Metapenaeopsis costata Crosnier, 1991. Philippines.

Metapenaeopsis crassissima Racek and Dall, 1965. Western Australia, Northern Territory, South Australia, Australia.

Metapenaeopsis dalei (Rathbun, 1902). Gulf of Tonkin; Taiwan; China; Japan; Korea.

Metapenaeopsis difficilis Crosnier, 1991. Indonesia; Philippines; Coral Sea; New Caledonia; Marquesas Islands; Wallis and Futuna Islands.

Metapenaeopsis distincta (De Man, 1907). Indonesia; New Britain; New Caledonia; Palau; Bikini Atoll, Marshall Islands; Wallis and Futuna Islands.

Metapenaeopsis dura Kubo, 1949. Taiwan; Japan.

Metapenaeopsis erythraea Crosnier, 1987. Red Sea.

Metapenaeopsis evermanni (Rathbun, 1906). Indonesia; Chesterfield Islands; New Caledonia; Molokai Island, Hawaii.

Metapenaeopsis faouzii (Ramadan, 1938). Seychelles; Maldive Islands.

Metapenaeopsis fusca R.J.G. Manning, 1988. Western Australia; New Guinea.

Metapenaeopsis gaillardi Crosnier, 1991. Kenya; southern India; Sri Lanka; Indonesia; Chesterfield Islands; New Caledonia; Molokai Island, Hawaii.

Metapenaeopsis gallensis (Pearson, 1905). Tanzania; Madagascar; India; Maldive Islands; Sri Lanka; Malaysia; Indonesia; Philippines; northwestern Australia; New Caledonia.

Metapenaeopsis gerardoi Pérez Farfante, 1971a. Florida Keys; West Indies; Caribbean coast of Central and South America; St. Helena Island.

Metapenaeopsis goodei (Smith, 1885b). North Carolina to Florida, Gulf of Mexico to Pensacola; Yucatan; Bahamas; Caribbean Islands and coast of Central and South America to Bahia, Brazil; Bermuda.

Metapenaeopsis hilarula (De Man, 1911). Natal, South Africa; Mozambique; Madagascar; Gulf of Aden; Seychelles; Réunion; Maldive Islands; Sri Lanka; Singapore; Malaysia; Indonesia; Philippines; New Guinea; Queensland, Australia; New Caledonia; Chesterfield Islands; Tahiti.

Metapenaeopsis hobbsi Pérez Farfante, 1971a. West Indies; Caribbean coast of Central and South America to Espírito Santo, Brazil.

Metapenaeopsis incisa Crosnier, 1991. Iles Glorieuses; Maldive Islands.

Metapenaeopsis ivanovi Crosnier, 1994b. Off Kenya.

Metapenaeopsis kishinouyei (Rathbun, 1902). Western Baja California Norte to tip of Baja California Sur, Gulf of California to Jalisco, Mexico; Rocas Alijos; Islas Revillagigedo; Clipperton Island; Panama; Galapagos Islands.

Metapenaeopsis kyushuensis (Yokoya, 1933). Japan.

Metapenaeopsis lamellata (De Haan, 1844). Malaysia; Indonesia; Thailand; Philippines; Taiwan; Japan; China; Western Australia, Queensland, Northern Territory, Australia; New Caledonia.

Metapenaeopsis lata Kubo, 1949. South China Sea; Japan.

Metapenaeopsis laubieri Crosnier, 1991. Malaysia; Indonesia; Philippines.

Metapenaeopsis lindae R.J.G. Manning, 1988. Western Australia.

Metapenaeopsis liui Crosnier, 1987. Indonesia; Philippines; north-western and northern Australia.

Source : MNHN, Paris

Metapenaeopsis mannarensis De Bruin, 1965. Sri Lanka; Indonesia; northwestern Australia; Chesterfield Island; New Caledonia.

Metapenaeopsis manningi Crosnier, 1994b. Off Somalia.

Metapenaeopsis marquesas Crosnier, 1991. New Caledonia; Marquesas Islands.

Metapenaeopsis martinella Pérez Farfante, 1971a. Antilles, Western Caribbean to Pernambuco, Brazil.

Metapenaeopsis menoui Crosnier, 1991. Seychelles; Indonesia; Philippines; New Guinea; Northwestern Australia; New Caledonia.

Metapenaeopsis miersi Holthuis, 1952a. Mauritania to Angola.

Metapenaeopsis mineri Burkenroad, 1934a. West coast of Baja California Sur, and Gulf of California, Mexico; Panama.

Metapenaeopsis mogiensis complanata Crosnier, 1991. Northern Australia; Chesterfield Islands; Bellona Island; New Caledonia.

Metapenaeopsis mogiensis consobrina (Nobili, 1904). Natal, South Africa; Djibouti, East Africa; Red Sea; Gulf of Aden; Madagascar; Seychelles; Persian Gulf; India; Sri Lanka; South China Sea; Indonesia.

Metapenaeopsis mogiensis intermedia Crosnier, 1991. Indonesia; Thailand; South China Sea; Philippines; Taiwan.

Metapenaeopsis mogiensis mogiensis (Rathbun, 1902). Japan.

Metapenaeopsis novaeguineae (Haswell, 1879). New Guinea; Western Australia, Northern Territory and Queensland, Australia.

Metapenaeopsis palmensis (Haswell, 1879). Singapore; Malaysia; Thailand; Vietnam; Indonesia; Philippines; Taiwan; Japan; New Guinea; Western Australia, Northern Territory, Queensland, and New South Wales, Australia.

Metapenaeopsis parahilarula Crosnier, 1991. Philippines.

Metapenaeopsis parapalmensis Crosnier, 1994a. Indonesia; Philippines.

Metapenaeopsis persica Crosnier, 1991. Saudi Arabia, Persian Gulf.

Metapenaeopsis philippii (Bate, 1881). Indonesia; Philippines; Admiralty Islands.

Metapenaeopsis propinqua Crosnier, 1991. New Caledonia.

Metapenaeopsis provocatoria longirostris Crosnier, 1987. Taiwan; Japan; Korea; Western Australia.

Metapenaeopsis provocatoria provocatoria Racek and Dall, 1965. Indonesia; Philippines; Queensland, Australia; New Caledonia; Wallis and Futuna Islands.

Metapenaeopsis proxima Crosnier, 1991. Seychelles.

Metapenaeopsis quadrilobata Crosnier, 1991. Nosy Be, Northwestern Madagascar.

Metapenaeopsis quinquedentata (De Man, 1907). Tanzania; Indonesia; Philippines; New Caledonia.

Metapenaeopsis richeri Crosnier, 1991. Indonesia; Landsdowne-Fairway Bank; Chesterfield Islands.

Metapenaeopsis rosea Racek and Dall, 1965. New Guinea; Queensland and Northern Territory, Australia.

Metapenaeopsis scotti Champion, 1973. Natal, South Africa; Off Tanzania; Madagascar; Réunion.

Metapenaeopsis sibogae (De Man, 1907). Indonesia; Philippines.

Source : MNHN, Paris

Metapenaeopsis sinica Liu and Zhong, 1988. Malaysia; Indonesia; South China Sea; Philippines; Taiwan; Japan; Queensland, Australia; Chesterfield Islands; New Caledonia.

Metapenaeopsis sinuosa Dall, 1957. Northern Territory and Queensland, Australia.

Metapenaeopsis smithi (Schmitt, 1924). South-east Florida to Tortugas Islands; Arrecife Alacrán, Mexico; West Indies; Caribbean coast of Central and South America.

Metapenaeopsis spatulata Crosnier, 1991. Philippines.

Metapenaeopsis spiridonovi Crosnier, 1991. Seychelles.

Metapenaeopsis stokmani Burukovsky, 1990. South-east Pacific Ocean near Sala-y-Gómez.

Metapenaeopsis stridulans (Alcock, 1905). Gulf of Aden; Persian Gulf; Gulf of Oman; Arabian Sea; India; Maldive Islands; Sri Lanka; Bay of Bengal; Malaysia; Singapore; Thailand; Vietnam; South China Sea; Philippines; Indonesia; Chesterfield Islands; New Caledonia.

Metapenaeopsis tarawensis Racek and Dall, 1965. Maldive Islands; Cocos Keeling Island; Northern Australia; New Caledonia; Caroline Islands; Gilbert Islands; Tuamoto, Polynesia.

Metapenaeopsis tchekunovae Starobogatov, 1972. Gulf of Tonkin.

Metapenaeopsis tenella Liu and Zhong, 1988. South China Sea.

Metapenaeopsis toloensis Hall, 1962. Arabian Sea; Maldive Islands; Sri Lanka; Andaman Sea; Bay of Bengal; Malaysia; Thailand; Indonesia; Gulf of Tonkin; South China Sea; Philippines; New Guinea; Australia; Chesterfield Islands.

Metapenaeopsis vaillanti (Nobili, 1904). Suez Canal; Red Sea; Gulf of Aden; Arabian Sea.

Metapenaeopsis velutina (Dana, 1852a). Seychelles; South China Sea; Philippines; Queensland and northwestern Australia; New Caledonia; Chesterfield Islands; Hawaii; Pitcairn Island.

Metapenaeopsis wellsi Racek, 1967. Western Australia and northwestern Australia.

Genus ***Metapenaeus*** Wood-Mason, 1891

Figures 63-65

Penaeus - MIERS, 1878, Proc. zool. Soc. London, : 301 [part].

Mangalura Miers, 1878, Proc. zool. Soc. London, : 303. — BURKENROAD, 1959, Miss. Dollfus Egyp., Résult. Scient., 3: 86. — HOLTHUIS, 1962, Bull. zool. Nom., 19(2): 106. — BURKENROAD, 1963a, Bull. zool. Nom., 20(3): 169; 1963b, Bull zool. Nom., 20(4): 247; 1983, Crust. Issues, 1: 280. — HOLTHUIS, 1963, Bull. zool. Nom., 20(4): 246. — BURKENROAD, 1983, Crust. Issues, 1: 280, 282.

Placed on the Official List of Generic Names in Zoology, International Commission on Zoological Nomenclature, 1969, Opinion 864, Name No. 1830, Bull. zool. Nom., 25 (4/5): 140 "Ruled under the plenary powers not to be given precedence over *Metapenaeus* Wood-Mason, 1891." Type species: By monotypy, *Mangalura dobsoni* Miers, 1878, Proc. zool. Soc. Lond., 1878: 302, pl. 17, fig. 2. Type locality: Mangalur (Mangalore), west of India. Gender: Feminine.

Metapenaeus Wood-Mason, 1891, Ann. Mag. nat. Hist., (6)8: 271: [part]. — BURKENROAD, 1934a, Bull. Bingham oceanogr. Coll., 4(7): 4, 7, 29. — KUBO, 1949, J. Tokyo Coll. Fish., 36(1): 327. — BARNARD, 1950, Ann. S. Afr. Mus., 38: 596. — DALL, 1957, Aust. J. mar. Freshwat. Res., 8(2): 182. — HOLTHUIS, 1962, Bull. zool. Nom., 19(2): 106. — BURKENROAD, 1963b, Bull. zool. Nom., 20(4): 169; 1963c, Bull. zool. Nom., 20(4): 247. — HOLTHUIS, 1963, Bull. zool. Nom., 20(4): 245. — RACEK and DALL, 1965, Verh. K. Akad. Wet., 56(3): 54. — MIQUEL, 1982, Zool. Verh., Leiden, 195: 5. — MOTOH and BURI, 1984, Res. Crust., (13/14): 51. — DALL *et al.*, 1990, Adv. Mar. Biol., 27: 79.

Placed on the Official List of Generic Names in Zoology, International Commission on Zoological Nomenclature, 1969, Opinion 864, Name No. 1829, Bull. zool. Nom., 25 (4/5): 140. "Ruled under the plenary powers to be given precedence over *Mangalura* Miers, 1878."

Source : MNHN, Paris

Peneus (Metapeneus) - ALCOCK, 1901, Descr. Cat. Indian Deep-Sea Crust., : 14.
Metapeneus - ALCOCK, 1905, Ann. Mag. nat. Hist., (7)16: 516 [part]; 1906, Cat. Indian Dec. Crust., 3(1): 16 [part].
Penaeopsis. — A. MILNE EDWARDS and BOUVIER, 1909, Mem. Mus. comp. Zool. Harv., 37(3): 220 [part]. — DE MAN, 1911, Siboga Exped., 39a: 53 [part]. — SCHMITT, 1926, Zool. (biol.) Results Fish. Exp. 'Endeavour', 5(6): 319, [part].

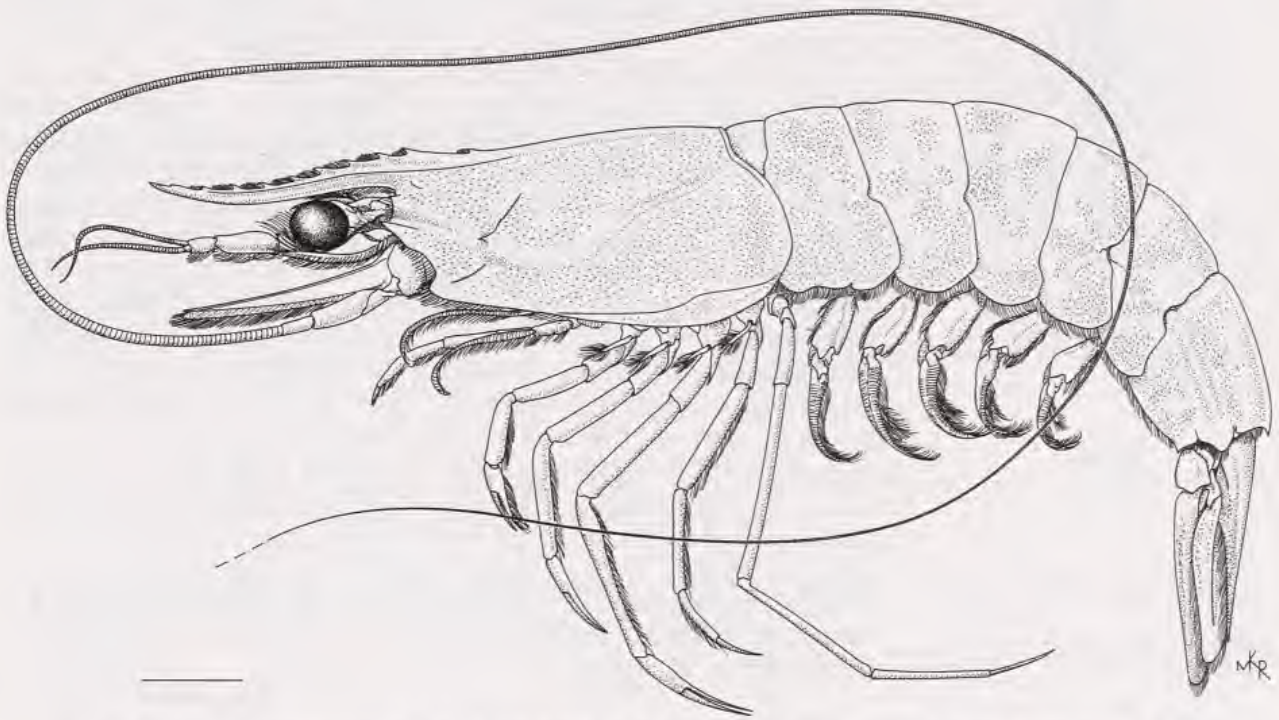


FIG. 63. — *Metapenaeus affinis*, ♀ 35.5 mm cl, Orissa coast, India. Lateral view. Scale = 10 mm.

TYPE SPECIES: By original designation: *Penaeus affinis* H. Milne Edwards, 1837, Hist. Nat. Crust., 2: 416.

TYPE LOCALITY: Côte de Malabar (now Kerala), southwest of India.

GENDER: Masculine.

DIAGNOSIS. — Integument variably pubescent, sometimes almost entirely glabrous. Rostrum armed with dorsal teeth only and varying considerably in length; epigastric tooth often conspicuously separated from first rostral tooth. Carapace with orbital angle usually sharp, but lacking spine, antennal and hepatic spines pronounced; pterygostomian margin rounded, lacking spine; postocular sulcus deep; gastro-orbital carina absent; orbito-antennal and cervical sulci well marked; hepatic sulcus anterior to hepatic spine well defined and accompanied by ventral carina often descending almost vertically from spine then turning towards pterygostomian angle, sulcus posterior to hepatic spine ill-defined or absent; branchiocardiac carina variably developed, from strong, long or short to indistinct; longitudinal and transverse sutures absent. Sixth abdominal somite bearing single continuous cicatrix, or latter interrupted into two or three parts. Telson lacking fixed subapical spines but bearing movable, sometimes minute and very numerous, posterolateral ones.

Source : MNHN, Paris

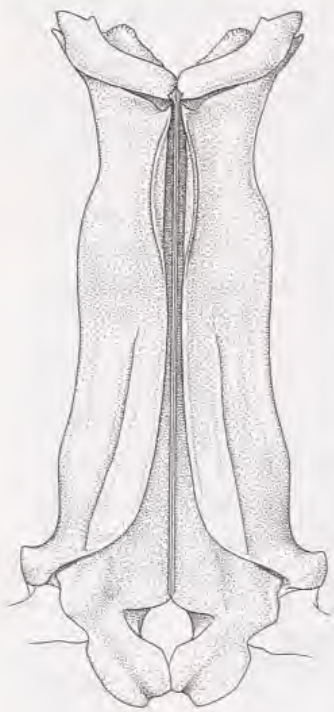


FIG. 64. — *Metapenaeus affinis*, ♂ 30 mm cl, Orissa coast, India. Petasma, ventral view. Scale = 1 mm.

Antennule lacking parapenaeid spine; antennular flagella shorter than carapace. Palp of first maxilla biarticulate, distal article minute, large basal article bearing weak proximolateral lobule and large and small proximomesial lobules, latter armed with long mesial spine. Basial spine on first through third pereopods, in some species ischial spine on first. Fifth pereopod modified in male: ischium usually bearing lateral keel, and merus exhibiting proximal notch followed by conspicuous knob or spiniform process. Pleurobranchia present on somite XIII. Exopod lacking on fifth pereopod.

Petasma symmetrical, semiclosed, depressed, with median lobes usually produced into simply curved, hoodlike, or convoluted distal projections; sclerotized lateral lobes produced distally in spoutlike obliquely or fully lateral projections and with ventrolateral recurved, flaplike to complex, mesial process. Appendix masculina narrow basally, greatly expanded distally and strongly convex ventrally. Thelycum closed, with paired lateral plates of sternite XIV often continuous across sternite, usually more or less enveloping posterior end of elongate median protuberance of sternite XIII. Seminal receptacles, for example in *M. affinis* and *M. ensis*, consisting of paired posteriorly rigid, anteriorly membranous pyriform sacs, continuous basally and opening through sternal transverse slit between sternites XIV and XIII; sacs extending anteriorly into sternite XIII and opening through paired slits lying lateral to posterior part of median protuberance, dorsal to base of fourth pereopods. A general account of the seminal receptacles was given by BURKENROAD (1934a) and more recently HASSAN (1981) described in detail the development and structure of the seminal receptacles of *M. affinis*.

Distribution of branchiae, epipods, and exopods in the genus *Metapenaeus*.

Somite	VII (Mxp1)	VIII (Mxp2)	IX (Mxp3)	X (P1)	XI (P2)	XII (P3)	XIII (P4)	XIV (P5)
Pleurobranchiae	-	-	1	1	1	1	1	-
Arthrobranchiae	r	2	2	2	2	2	1+v	-
Podobranchiae	-	1	-	-	-	-	-	-
Epipods	1	1	-	1	1	1	-	-
Exopods	1	1	1	1	1	1	1	-

SPECIES. — *Metapenaeus affinis* (H. Milne Edwards, 1837). Persian Gulf; Arabian Sea, from Gulf of Oman to South India; Sri Lanka; Andaman Islands; Malaysia; Singapore; Borneo; Thailand; Gulf of Tonkin; South China Sea; Philippines; Hong Kong; Taiwan; New Guinea; Hawaii.

Metapenaeus alcocki George and Rao, 1968. Gulf of Kutch, India.

Metapenaeus anchistus (De Man, 1920). Malaysia; Borneo; Thailand; Philippines; Fiji; Wallis and Futuna Islands.

Metapenaeus bennettae Racek and Dall, 1965. Queensland, New South Wales, Australia.

Source : MNHN, Paris

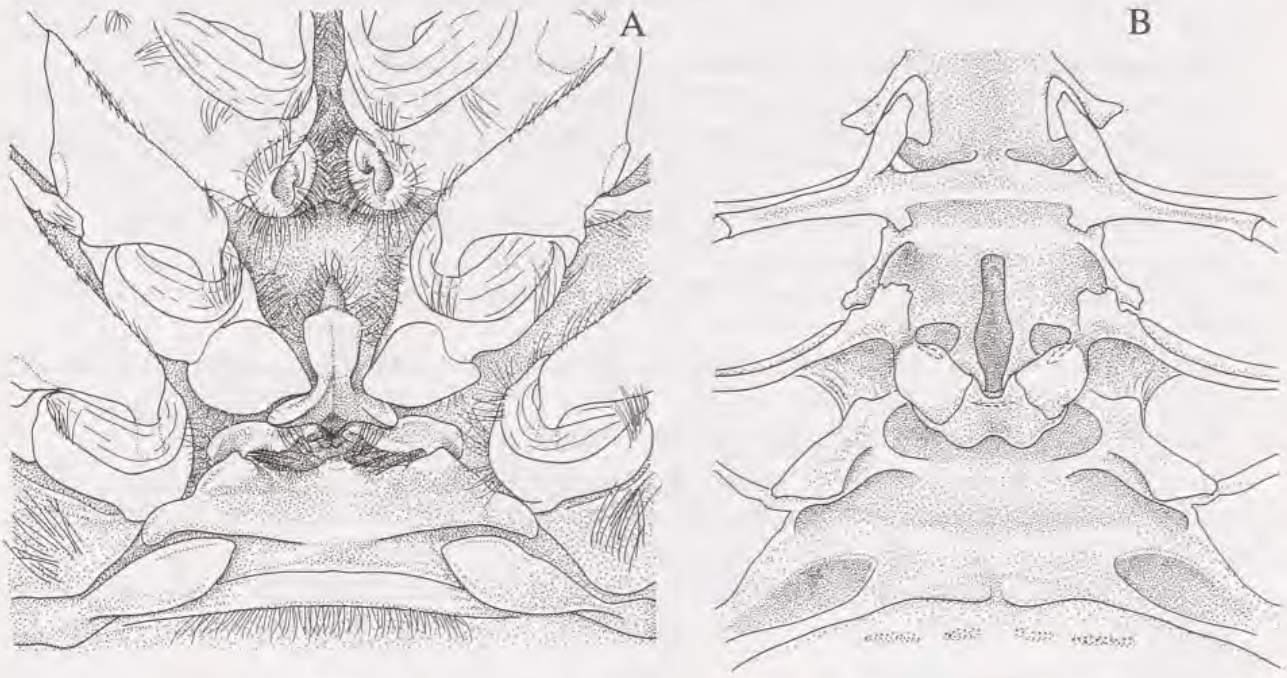


FIG. 65. — *Metapenaeus affinis*, ♀ 35.5 mm cl, Orissa coast, India. **A**, Thelycum. **B**, ♀ 39 mm cl, Gulf of Kutch, India. Seminal receptacles, dorsal view. Scales = 1 mm.

Metapenaeus brevicornis (H. Milne Edwards, 1837). Pakistan to Mangalore, India; Bay of Bengal; Malaysia; Singapore; Borneo; Thailand; Vietnam.

Metapenaeus conjunctus Racek and Dall, 1965. Singapore; Malaysia; Indonesia; North Borneo; Philippines; Northern Territory, Australia.

Metapenaeus dalli Racek, 1957. Indonesia; Philippines; Western Australia, Northern Territory, Australia.

Metapenaeus demani demani (Roux, 1921). New Guinea; Northern Territory, Australia.

Metapenaeus demani stephani Miquel, 1982. New Guinea; Queensland, Australia.

Metapenaeus dobsoni (Miers, 1878). Western India; Sri Lanka; Andaman Islands; Malaysia; Gulf of Thailand; Indonesia; Philippines; New Guinea.

Metapenaeus eboracensis Dall, 1957. New Guinea; Northern Territory, Queensland, Australia.

Metapenaeus elegans De Man, 1907. Sri Lanka; Andaman Islands; Malaysia; Borneo; Thailand; Philippines; New Guinea; Fiji; Wallis and Futuna Islands.

Metapenaeus endeavouri (Schmitt, 1926). New Guinea; Western Australia, Northern Territory, Queensland, New South Wales, Australia.

Metapenaeus ensis (De Haan, 1844). India; Bangladesh; Sri Lanka; Bay of Bengal; Malacca Straits; Malaysia; Indonesia; Borneo; Gulf of Tonkin; South China Sea; Philippines; Hong Kong; Taiwan; Japan; New Guinea; Western Australia, Northern Territory, Queensland, New South Wales, Australia; Wallis and Futuna Islands.

Metapenaeus insolitus Racek and Dall, 1965. Northern Territory, Queensland, Australia.

Metapenaeus intermedius (Kishinouye, 1900). Andaman Islands; Singapore; Malaysia; Borneo; Gulf of Tonkin; South China Sea; Hong Kong; Taiwan; Japan.

Source : MNHN, Paris

Metapenaeus joyneri (Miers, 1880). Gulf of Tonkin; South and East China; Taiwan; Japan; Korea.

Metapenaeus krishnatrii Silas and Muthu, 1976. Andaman Islands.

Metapenaeus kutchensis George, George and Rao, 1963. Gulf of Kutch, India.

Metapenaeus lysianassa (De Man, 1888). India; Sri Lanka; Bay of Bengal; Singapore; North Borneo; Thailand; Vietnam.

Metapenaeus macleayi (Haswell, 1879). Queensland, New South Wales, Australia.

Metapenaeus monoceros (Fabricius, 1798). Eastern Mediterranean; Red Sea; East coast of South Africa; Mozambique; Madagascar; Réunion; Mauritius; Saudi Arabia; Pakistan; India; Sri Lanka; Burma; Malaysia.

Metapenaeus moyebi (Kishinouye, 1896). South India; Sri Lanka; Bay of Bengal; Malaysia; Borneo; Thailand; China; Phillipines; Taiwan; Japan.

Metapenaeus papuensis Racek and Dall, 1965. Thailand; Philippines; New Guinea.

Metapenaeus stebbingi Nobili, 1904. Eastern Mediterranean; Southeast African coast; Mozambique; Gulf of Suez; Red Sea; Madagascar; Yemen; Saudi Arabia; Persian Gulf; Pakistan; Northern India.

Metapenaeus suluensis Racek and Dall, 1965. Gulf of Thailand; Philippines; New Guinea.

Metapenaeus tenuipes Kubo, 1949. Malaysia; Singapore; North Borneo; Thailand; Philippines; Taiwan.

Genus ***Miyadiella*** Kubo, 1949

Figures 66-67

Penaeus - STIMPSON, 1860, Proc. Acad. nat. Sci. Philad., 12: 43.

Miyadiella Kubo, 1949, J. Tokyo Coll. Fish., 36(1): 105, 264. — HOLTHUIS, 1955b, Vidensk. Medd. Dansk Naturh. Foren., 117: 75. — STAROBOGATOV, 1972, Akad. Nauk SSSR Zool. Inst. Isled. Fauney Moreii, 10(18): 369. — HOLTHUIS, 1980b, FAO Fish. Synop., 125, 1: 13. — BURKENROAD, 1983, Crust. Issues, 1: 287. — LIU and ZHONG, 1988, Pen. Shr. S. China Sea, : 102. — DALL *et al.*, 1990, Adv. Mar. Biol., : 27. — HAYASHI, 1992, Dendr. Crust. Jap. Waters, : 72.

TYPE SPECIES: By original designation, *Miyadiella pedunculata* Kubo, 1949, J. Tokyo Coll. Fish., 36(1): 264 [= *Penaeus podophthalmus* Stimpson, 1860, Proc. Acad. Nat. Sci. Philad., 12: 43].

TYPE LOCALITY: Osaka-wan, Japan.

GENDER: Feminine.

DIAGNOSIS. — Integument thin, studded with microscopic setae. Rostrum short, not reaching distal margin of first antennular segment, with dorsal teeth only; epigastric tooth markedly separated from first rostral tooth. Carapace with orbital angle rounded, lacking spine; antennal spine present; hepatic spine present or absent; lacking pterygostomian spine; postrostral carina extending to about midlength or three-fourths of carapace, bearing rows of minute spinules, which also present on first few rostral teeth; postocular sulcus well marked; cervical sulcus short or long, almost reaching middorsum of carapace, accompanying carina sharp; hepatic sulcus and carina clearly distinct anteriorly, there extending anteroventrally, both weak or indistinct posteriorly; branchiocardiac carina long but feeble; longitudinal and transverse sutures lacking. Sixth abdominal somite without cicatrices. Telson lacking movable posterolateral spines, or

Source : MNHN, Paris

armed with three pairs of small marginal, well-spaced ones, with few simple submarginal setae, and considerably elongate, plumose marginal setae subapically.

Eye extremely elongate, reaching to between midlength of second antennular segment and about midlength of third (first and second antennular segments considerably elongate). Parapenaeid spine absent; stylocerite produced into sharply pointed spine and proximomesially bearing small sharply pointed scale. Antennular flagella subequal or dorsal flagellum slightly

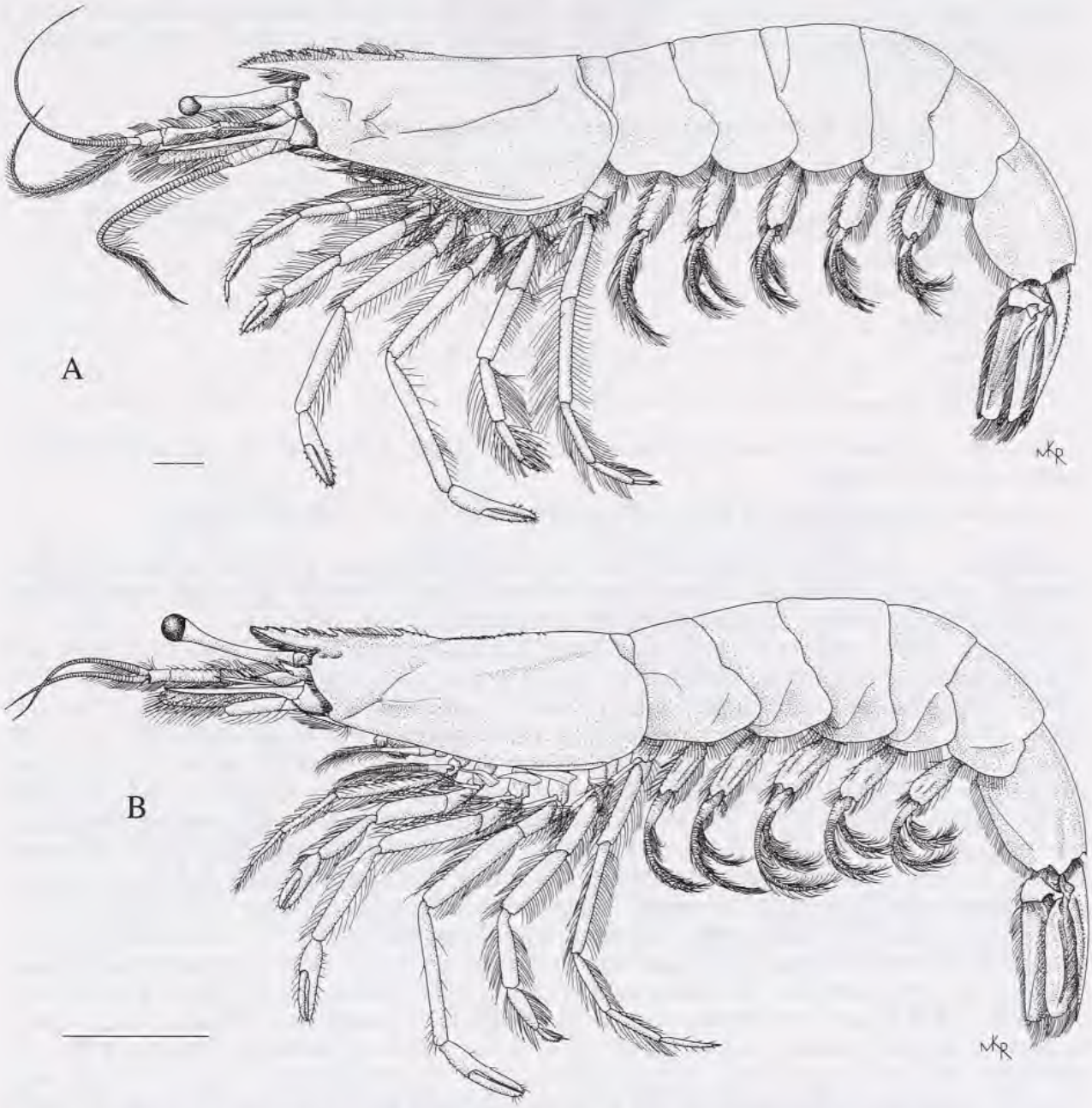


FIG. 66 A. — *Miyadiella podophthalmus*, ♀ 6.5 mm cl, East China Sea. Lateral view. Scale = 1 mm.
FIG. 66 B. — *Miyadiella ornata*, ♀ holotype, 38 mm tl, northeast of Java. Lateral view (carapace slightly displaced dorsally). Scale = 5 mm.

Source : MNHN, Paris

longer than ventral, moderately long, half to two-thirds as long as carapace. Palp of first maxilla entire, produced into minute setose proximolateral lobe and broad setose proximomesial lobe followed by sharp spine. Basial spine present or absent, ischial present on first pereopod, basial and ischial on second and third. Fifth pereopod reaching about midlength of scaphocerite.

Petasma semi-open, symmetrical, with minute cincinnuli along dorsomesial margin; median and lateral lobes simple, not folded, median bearing moderately broad proximal projection and lateral one, long rather flexible costa. Appendix masculina subelliptical, very slightly convex dorsally and bearing row of small marginal setae. Thelycum open, possessing basally broad anteromedian spine on sternite XIV, preceded by rounded scales or possessing elongate flaplike lateral plates (free along most of their length); median protuberance of sternite XIII either short, not reaching sternite XIV, or extending well into latter.

Distribution of branchiae, epipods, and exopods in the genus *Miyadiella*.

Somite	VII (Mxp1)	VIII (Mxp2)	IX (Mxp3)	X (P1)	XI (P2)	XII (P3)	XIII (P4)	XIV (P5)
Pleurobranchiae	-	-	1	1	1	1	-	-
Arthrobranchiae	-	2	2	2	2	1	1	1 (-)
Podobranchiae	-	1	-	-	-	-	-	-
Epipods	1	1	-	1	1	1	-	-
Exopods	1	1	1	1	1	1	1	1

SPECIES. — *Miyadiella podophthalmus* (Stimpson, 1860). Maharashtra, west coast of India; South China Sea; Japan.

Miyadiella ornata Holthuis, 1955b. Northeast Java and Arafura Sea, Indonesia.

REMARKS. — The generic status of *Miyadiella pedunculata* Kubo, 1949, and *Miyadiella ornata* Holthuis, 1955b, has been the object of two interpretations: that they belong to *Atypopenaeus* Alcock, 1905, or that they should be retained in *Miyadiella* Kubo, 1949.

ALCOCK (1905) was the first to suggest that *Penaeus stenodactylus* Stimpson, 1860, and *P. podophthalmus* Stimpson, 1860, might belong to the genus *Atypopenaeus*. STAROBOGATOV (1972) having the same opinion, recognized *Penaeus podophthalmus* and *Miyadiella pedunculata* Kubo, 1949, as synonyms of *A. stenodactylus* and assigned it and *M. ornata* Holthuis, 1955b (which he considered to be the young *A. dearmatus* De Man, 1907) to the genus *Atypopenaeus*. BURKENROAD (1983) also suggested such a tentative synonymy for the genus, and HOLTHUIS (1980) recognized STIMPSON's species as well as *M. pedunculata* as synonyms of *Atypopenaeus stenodactylus*. Recently, HAYASHI (1992) stated that the long eyestalks, considered a character typical of *Miyadiella*, become very short in specimens of *A. stenodactylus* having a carapace length greater than 8.5 mm, in this respect being similar to those of the adult of the latter.

We have examined a specimen of *Atypopenaeus compressipes* with 7.2 mm carapace length, total length of about 27 mm, which has short eyestalks that do not overreach the first antennular segment, a length at which, according to HAYASHI (1992) juveniles of the genus possess long eyestalks. We also have examined specimens of *Miyadiella ornata* from Indonesian waters with a carapace length of 10 mm, a total length of 37.5 mm from the Muséum National d'Histoire Naturelle, Paris (material kindly made available by Dr. Alain CROSNIER), with extremely long eyestalks, thus, longer than specimens of *Atypopenaeus* exhibiting short ones; this specimen also possesses clearly developed spinules on the first rostral teeth and along the postrostral carina, another feature typical of *Miyadiella*; moreover, it has relatively short fifth pereopods, reaching to about the end of the basal third of the scaphocerite, instead of extending by at least the length of

Source : MNHN, Paris

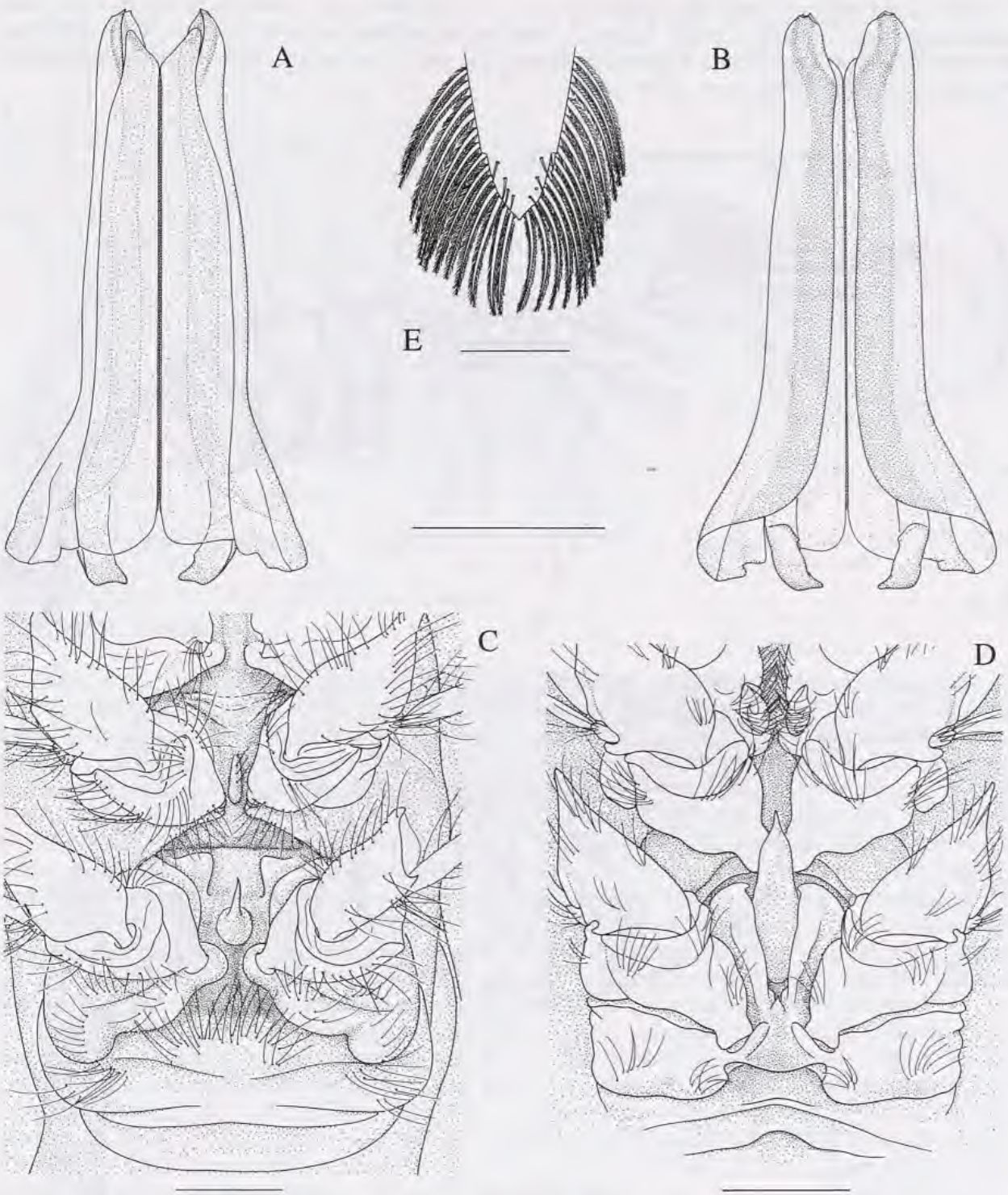


FIG. 67 A-C. — *Miyadiella podophthalmus*, ♂ 7 mm cl, Jiazi Lufeng, Guangdong, South China Sea. **A**, Petasma, dorsal view. **B**, Petasma, ventral view. — **C**, ♀ 6.5 mm cl, East China Sea. Thelycum. Scales = 5 mm.

FIG. 67 D-E. — *Miyadiella ornata*, holotype, ♀ 38 mm tl, northeast of Java. **D**, Thelycum. Scale = 1 mm. **E**, Posterior extremity of telson. Scale = 0.5 mm.

Source : MNHN, Paris

the dactyl beyond the antennular peduncle and, in one species (*A. bicornis*), as far as the tips of the antennular flagella. On the basis of these observations we are tentatively recognizing *Miyadiella* and *Atypopenaeus* as separate genera, the validity of which must await the laboratory rearing of juvenile members of these genera.

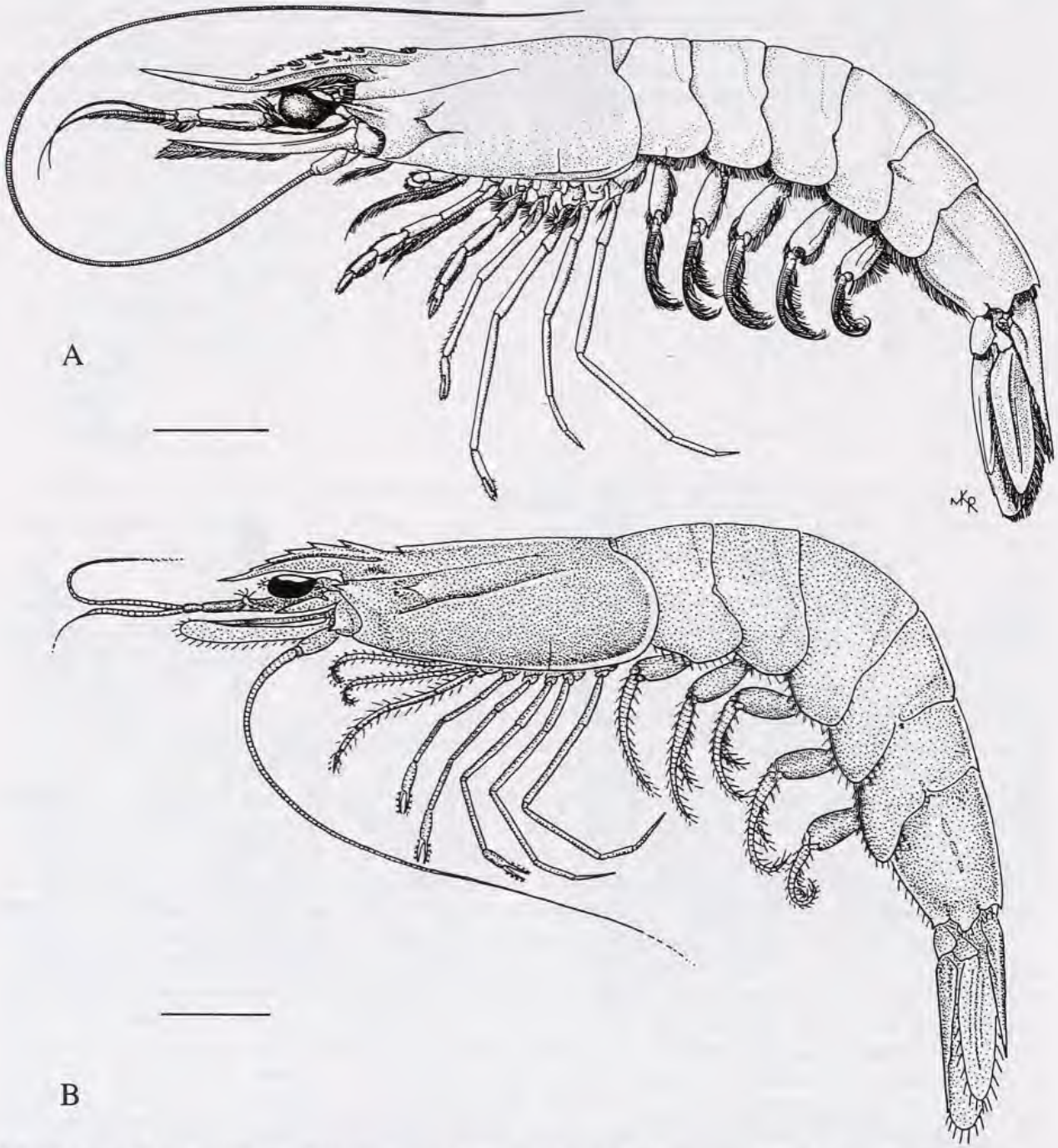


FIG. 68 A. — *Parapenaeopsis stylifera coromandelica*, ♀ 28.5 mm cl, Singapore. Lateral view. Scale = 10 mm.
FIG. 68 B. — *Parapenaeopsis balli*, ♀ 12.5 mm cl, west of Sacapulco, Chiapas, Mexico. Lateral view. Scale = 5 mm. (From PÉREZ FARFANTE and BOOTHE, 1986).

Source : MNHN, Paris

Genus *Parapenaeopsis* Alcock, 1901

Figures 68-71

Penaeus - H. Milne Edwards, 1837, Hist. Nat. Crust., 2: 411 [part].

Penaeopsis - Bate, 1881, Ann. Mag. nat. Hist., (5)8: 183 [part].

Peneus (Parapeneopsis) Alcock, 1901, Descr. Cat. Indian Deep-Sea Crust., : 14; 1906, Cat. Indian Dec. Crust., 3(1): 34.

Metapeneus - Alcock, 1905, Ann. Mag. nat. Hist., (7)16(95): 516 [part].

Parapenaeopsis [emendment of *Parapeneopsis* Alcock, 1901, under the plenary powers by the International Commission on Zoological Nomenclature, 1969]. Placed on the Official List of Generic Names in Zoology, International Commission on Zoological Nomenclature, 1969, Opinion 864, Name No. 1820, Bull. zool. Nom., 25(4/5): 139. — De Man, 1911, Siboga Exped., 39a: 92. — Balss, 1914a, Abh. bayer. Akad. Wiss., suppl. 2(10): 14; 1925, Wiss. Ergebn. Dt.-Tiefsee Exped. Valdivia, 20: 229. — Kubo, 1949, J. Tokyo Coll. Fish., 36(1): 368. — Barnard, 1950, Ann. S. Afr. Mus., 38: 604. — Dall, 1957, Austr. J. mar. Freshwat. Res., 8: 213. — Racek and Dall, 1965, Verh. K. Ned. Akad. Wet. Nat., 56(3): 96. — Liu and Wang, 1987, Oceanographia Limn. Sin., 18(6): 523. — Liu and Zhong, 1988, Penaeoid Shr. S. China Sea, : 195.

Trachypenaeus - Balss, 1916, Beitr. Kennt. Meeres. Westafr., : 17.

Parapeneopsis - Burkenroad, 1934a, Bull. Bingham oceanogr. Coll., 4(7): 58. — Burkenroad, 1983, Crust. Issues, 1: 283. — Dall *et al.*, 1990, Adv. Mar. Biol., 27: 83.

Type Species: By original designation, *Penaeus styliferus* H. Milne Edwards, 1837, Hist. Nat. Crust., 2: 418.

Type Locality: Environs of Bombay, India.

Gender: Feminine.

Diagnosis. — Body slender. Integument thin, minutely setose-punctate, never densely so. Rostrum armed with dorsal teeth only, variable in length and shape; epigastric tooth either close to or distinctly separated from first rostral tooth. Carapace with small orbital spine, sometimes reduced to not much more than sharp angle; well developed antennal (often continuous with carina) and hepatic spines; pterygostomian spine lacking, but angle sometimes sharply produced; postocular sulcus well defined; gastro-orbital carina absent; orbito-antennal and cervical sulci weak; hepatic sulcus usually clearly marked anteriorly, sometimes feebly posteriorly; hepatic carina often present, occasionally feeble, usually sharp and descending anteroventrally from hepatic spine then extending almost to pterygostomian angle, usually blunt posteriorly; branchiocardiac carina and sulcus clearly distinct to obsolete. Longitudinal suture falling short of posterior margin of carapace, transverse suture usually present. Sixth abdominal somite with single elongate cicatrix, or latter divided into two or three cicatrices. Telson armed with 3 to 5 (usually 4) small movable lateral spines, with one or two pairs of small subapical fixed spines or unarmed.

Antennule lacking parapenaeid spine; antennular flagella subequal, rather short to considerably long. Palp of first maxilla variable: (a) usually biarticulate, basial article produced into proximolateral lobule, broad proximomesial and much smaller distomesial lobules, latter often armed with spine; (b) sometimes entire, short, produced into same but less pronounced three lobules, distomesial one armed with one to five spines; subdistolateral row of spinules usually present on both. Basial spine present or absent on first and second pereopods; ischial spine present or absent on first. Epipod lacking on third pereopod.

Petasma symmetrical, semiclosed, variable in shape; median lobes only barely perceptible, moderately developed, or produced into oblique or fully lateral conspicuous projections; moderately well sclerotized lateral lobes distally produced into relatively short, often roughly spoutlike channeled projections, or elongate, hornlike ones (rarely semirectangular or strongly bifid), variably directed, channeled, or tubular, and opening by minute apical apertures; petasma

Source : MNHN, Paris

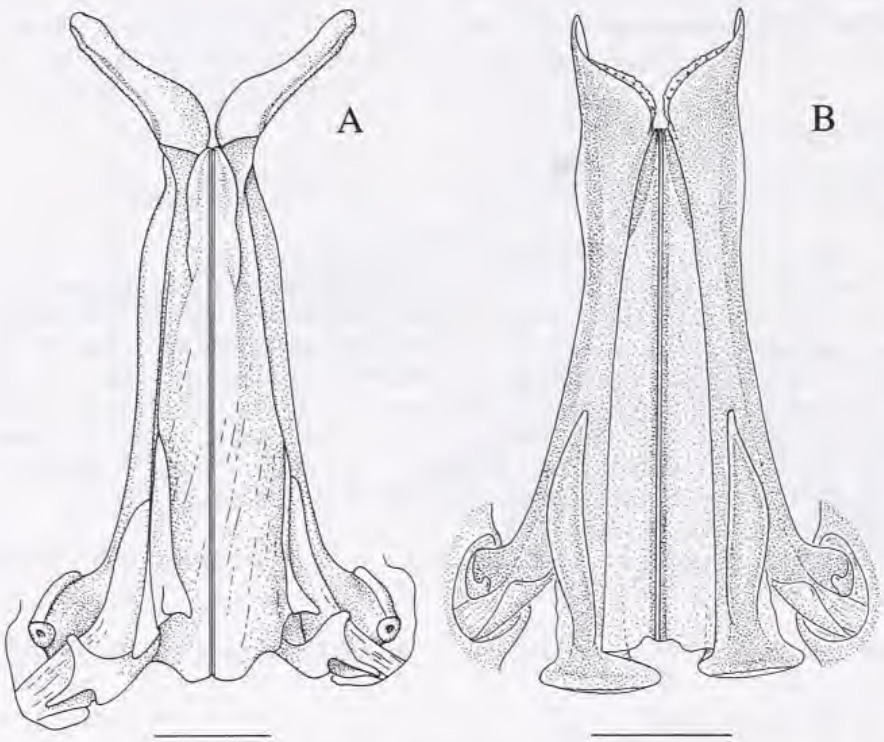


FIG. 69 A. — *Parapenaeopsis stylifera coromandelica*, ♂ 18 mm cl, Karachi market, Pakistan. Petasma, dorsal view. Scale = 1 mm.

FIG. 69 B. — *Parapenaeopsis balli*, 10.5 mm ♂ cl, west of Sacapulco, Chiapas, Mexico. Petasma, dorsal view. Scale = 1 mm. (From PÉREZ FARFANTE and BOOTHE, 1986).

sometimes expanded into large, auriculate proximolateral projections. Appendix masculina simple, or sometimes consisting of two segments, proximal one considerably larger than horse-shoe or cup-shaped distal one. Thelycum closed, with plate of sternite XIV broad, sometimes deeply emarginate anteriorly; median protuberance strong, usually concave, often shieldlike, as broad as or only slightly narrower than plate of XIV, occasionally extending as far as posterior thoracic ridge. Seminal receptacles exhibit considerable variation indicated from observations in limited number of species: minute elongate sacs [*P. hardwickii*, Burkenroad (1934a)], or strongly developed bilobed (*P. atlantica*) or trilobed (*P. stylifera, P. balli*) sacs (PÉREZ FARFANTE and BOOTHE, 1986); if bilobed, consisting of large pyriform posterior lobe and small anterolateral one; if trilobed, bearing additional anteromesial; receptacles opening ventrally through slits which in single sac, elongate, extending mesially along most of their length, in bilobed receptacles situated at the confluence of the posterior and lateral lobes, and in trilobed ones on anterior margin of mesial lobe, slits lying at posterodorsal margin of median protuberance, near base of fourth pereopods. As noted by BURKENROAD (1934a) in minute receptacles two openings, one for entrance (variably situated) and another for exit mesial to hoods of sternite XIV.

Distribution of branchiae, epipods, and exopods in the genus *Parapenaeopsis*.

Somite	VII (Mxp1)	VIII (Mxp2)	IX (Mxp3)	X (P1)	XI (P2)	XII (P3)	XIII (P4)	XIV (P5)
Pleurobranchiae	-	-	1	1	1	1	-	-
Arthrobranchiae	r	2	2	2	2	2	1	-
Podobranchiae	-	1	-	-	-	-	-	-
Epipods	1	1	-	1 (-)	1 (-)	-	-	-
Exopods	1	1	1	s	s	s	s	s

Source : MNHN, Paris

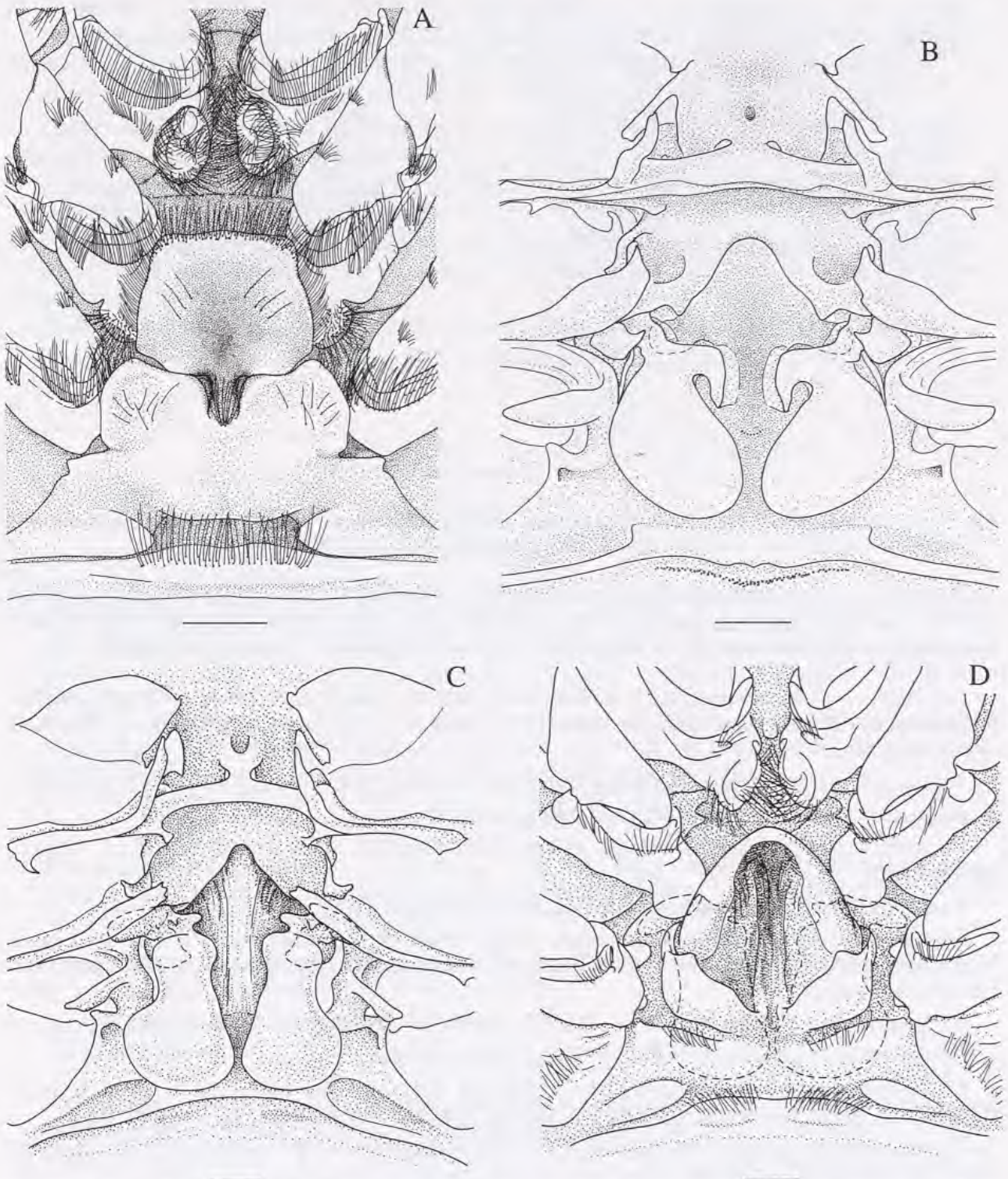


FIG. 70 A-B. — *Parapenaeopsis stylifera coromandelica*: **A**, ♀ 28.5 mm cl, Singapore. Thelycum. — **B**, ♀ 24.5 mm cl, Ganjam coast, India. Seminal receptacles, dorsal view. Scales = 1 mm.

FIG. 70 C-D. — *Parapenaeopsis atlantica*, ♀ 30 mm cl, off St. Paul river mouth, Liberia. **C**, Thelycum and outline of ventral view of seminal receptacles. **D**, Seminal receptacles, dorsal view. Scales = 1 mm.

Source : MNHN, Paris

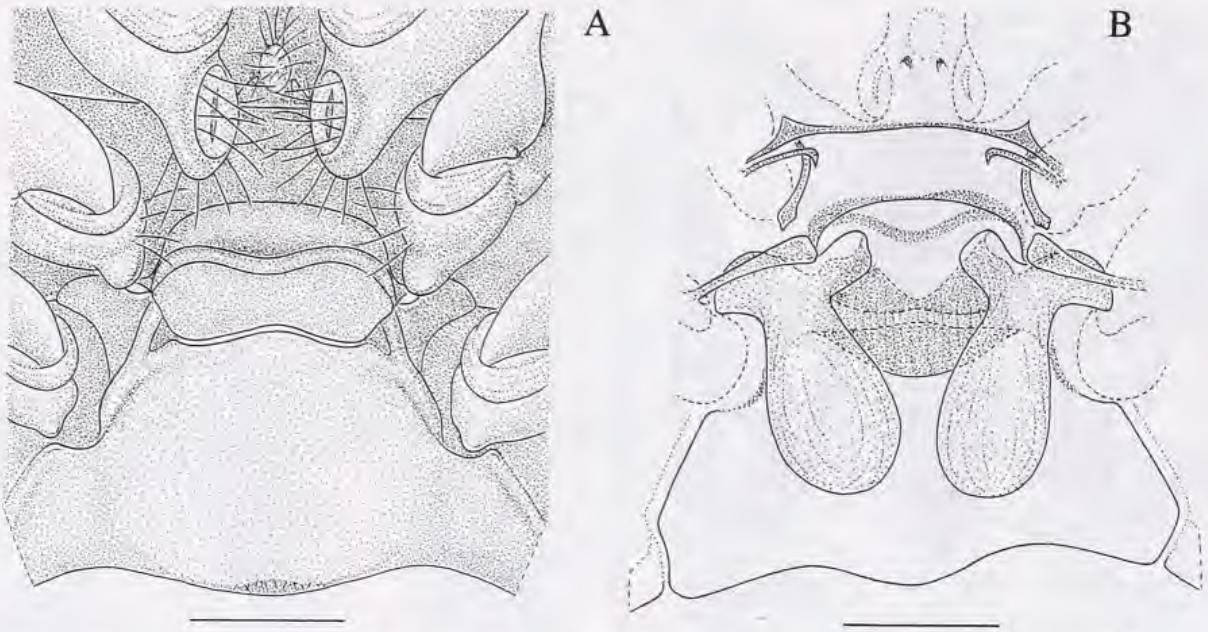


FIG. 71. — *Parapenaeopsis balli*, ♀ 12.5 mm cl, west of Sacapulco, Chiapas, Mexico: **A**, Thelycum. **B**, Seminal receptacles, dorsal view. Scales = 1 mm. (From PÉREZ FARFANTE and BOOTHE, 1986).

REMARKS. — It is probable that species currently assigned to this very heterogeneous genus will eventually be placed in several genera. The discussion above on the variations of the seminal receptacles clearly indicates the striking differences of these structures among the species.

SPECIES. — *Parapenaeopsis acclivirostris* Alcock, 1905. East coast of South Africa; Mozambique; Madagascar (Europa Island); Red Sea; Gulf of Aden; Persian Gulf; Pakistan; Western India; Sri Lanka.

Parapenaeopsis arafurica Racek and Dall, 1965. New Guinea; Northern Territory, Australia.

Parapenaeopsis aroaensis Hall, 1962. Malaysia.

Parapenaeopsis atlantica Balss, 1914c. West African coast from Senegal to Angola; Mozambique.

Parapenaeopsis balli Burkenroad, 1934a. Pacific Mexico; El Salvador.

Parapenaeopsis cornuta (Kishinouye, 1900). West and south coast of India; Sri Lanka; Singapore; Malaysia; Indonesia; South China Sea; Philippines; Hong Kong; Taiwan; Japan; New Guinea; Australia.

Parapenaeopsis cultirostris Alcock, 1906. India; Malaysia; Indonesia; South China Sea.

Parapenaeopsis gracillima Nobili, 1903. Malaysia; Borneo.

Parapenaeopsis hardwickii (Miers, 1878). Pakistan; West and East coasts of India; Bangladesh; Malaysia; Singapore; Borneo; Gulf of Tonkin; South China Sea; Taiwan; Japan.

Parapenaeopsis hungerfordi Alcock, 1905. Malaysia; Singapore; Indonesia; Gulf of Tonkin; South China Sea; Hong Kong.

Parapenaeopsis incisa Liu and Wang, 1987. South China; Taiwan.

Parapenaeopsis maxillipedo Alcock, 1906. India; Sri Lanka; Malaysia; Borneo; Philippines; New Guinea; northern Australia.

Source : MNHN, Paris

Parapenaeopsis nana Alcock, 1905. India; Sri Lanka.

Parapenaeopsis sculptilis (Heller, 1862a). Pakistan; west coast of India; Malaysia; Indonesia; South China Sea; Hong Kong; Philippines; Taiwan; New Guinea; Northern Australia.

Parapenaeopsis sinica Liu and Wang, 1987. South China Sea.

Parapenaeopsis stylifera coromandelica Alcock, 1906. East coast of India; Bangladesh; Malaysia; Gulf of Thailand; Indonesia.

Parapenaeopsis stylifera stylifera (H. Milne Edwards, 1837). Persian Gulf; Arabian Sea; Pakistan; Western India; Sri Lanka.

Parapenaeopsis tenella (Bate, 1888). India; Sri Lanka; Bangladesh; Malaysia; Indonesia; Gulf of Tonkin; China; Philippines; Hong Kong; Taiwan; Japan; Korea; New Guinea; Northern Australia.

Parapenaeopsis uncta Alcock, 1905. India; Sri Lanka; Bangladesh; Malaysia; Indonesia.

Parapenaeopsis venusta De Man, 1907. Malaysia; Indonesia; Queensland, Australia.

Genus ***Parapenaeus*** Smith, 1885

Figures 72-74

Peneus - Lucas, 1846, Hist. Nat. Anim. Artic., pt. 1: 46 [part].

Penaeus - Bate, 1881, Ann. Mag. nat. Hist., (5)8: 173 [part].

Parapenaeus Smith, 1885b, Proc. U.S. natn. Mus., 8(11/12): 170 [part]; 1886, Rep. U. S. Commnr Fish. for 1885: 685. — De Man, 1911, Siboga Exped., 39a: 77 [part]. — Burkenroad, 1934b, Bull. Am. Mus. nat. Hist., 68(2): 107. — Kubo, 1949, J. Tokyo Coll. Fish., 36(1): 398. — Barnard, 1950, Ann. S. Afr. Mus., 38: 600. — Dall, 1957, Aust. J. mar. Freshwat. Res., 8(2): 178. — Crosnier, 1986a, Mém. Mus. Hist. nat. Paris, (A), Zool., 133: 303. — Dall *et al.*, 1990, Adv. Mar. Biol., 27: 87.
Placed on the Official List of Generic Names in Zoology, International Commission on Zoological Nomenclature, 1961, Opinion 611, Name No. 1443, Bull. zool. Nom., 18(5): 306.

Peneus (Parapeneus) - Alcock, 1901, Descr. Cat. Indian Deep-Sea Crust., : 14 [part].

Parapeneus - Alcock, 1905, Ann. Mag. nat. Hist., (7)16(95): 519 [part]; 1906, Cat. Indian Dec. Crust., (3), Macr., : 30 [part]. — Burkenroad, 1934b, Bull. Am. Mus. nat. Hist., 68(2): 107; 1983, Crust. Issues, 1: 282.

Neopenaeopsis Bouvier, 1905b, C. r. hebd. Séanc. Acad. Sci., Paris, 141: 747. Type species: By original designation and monotypy, *Neopenaeopsis paradoxus* Bouvier, 1905b, C. r. hebd. Séanc. Acad. Sci., Paris, 141: 747 (= *Parapenaeus longirostris*). Type locality: Caribbean Sea. Gender: Feminine.

Type Species: By original designation: *Penaeus longirostris* Lucas, 1846, Explor. Sci. l'Algérie, Zool. 2. Hist. Nat. Anim. Artic., pt. 1: 46.

Type Locality: Off Cape Matifou, Algeria.

Gender: Masculine.

Diagnosis. — Integument glabrous. Rostrum armed with dorsal teeth (5-9) only, very variable in length; epigastric tooth situated conspicuously posterior to first rostral tooth. Carapace with orbital spine more or less pointed; with well developed antennal and hepatic spines; pterygostomian or branchiostegal spine usually present (absent in *P. longipes* Alcock, 1905, except in some small specimens), sometimes continuous with well marked carina; postocular and cervical sulci lacking; hepatic sulcus indistinct or weak; hepatic carina usually well defined only anteriorly; branchiocardiac carina absent; longitudinal suture long, extending almost to posterior

Source : MNHN, Paris

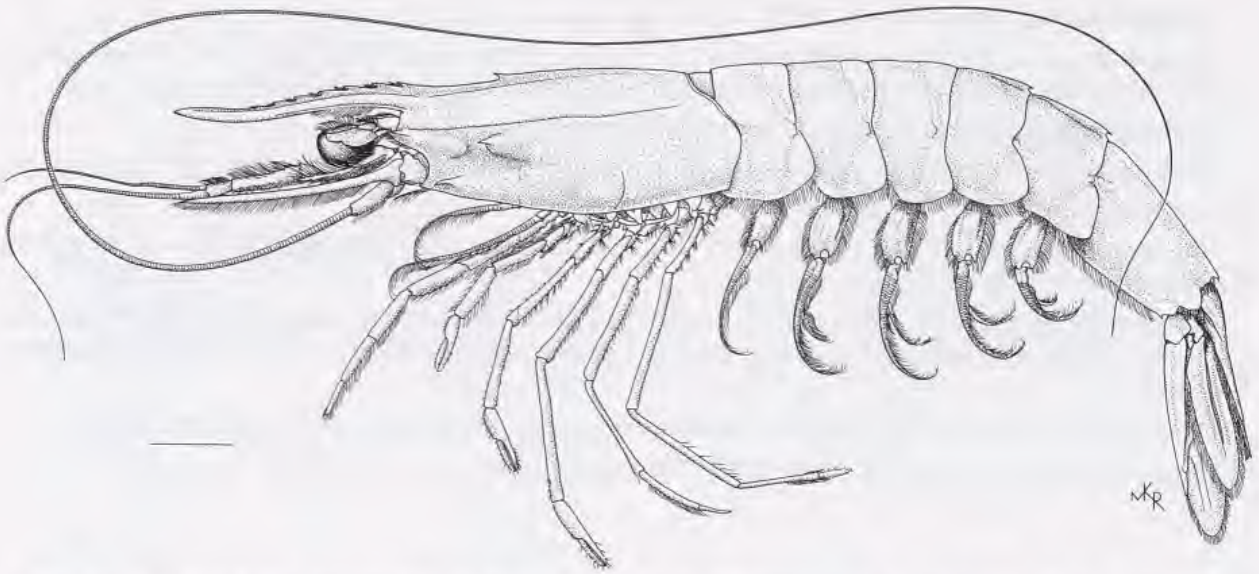


FIG. 72. — *Parapenaeus longirostris*, ♀ 34 mm cl, off Sicily, Mediterranean. Lateral view. Scale = 10 mm.

margin of carapace, transverse suture at level of second pereopod. Sixth abdominal somite without cicatrix. Telson armed with pair of long fixed lateral spines at about posterior third.

Antennule with small parapenaeid spine; antennular flagella sexually dimorphic: much longer in males than in females and ventral flagellum always longer than dorsal in females, whereas in males dorsal sometimes longer. Palp of first maxilla entire, broad, blunt and bearing small setose proximolateral and conspicuous mesial lobules. Basial and ischial spines on first pereopod only. Somite XIII with pleurobranchia and posterior arthrobranchia only.

Distribution of branchiae, epipods, and exopods in the genus *Parapenaeus*.

Somite	VII (Mxp1)	VIII (Mxp2)	IX (Mxp3)	X (P1)	XI (P2)	XII (P3)	XIII (P4)	XIV (P5)
Pleurobranchiae	-	-	1	1	1	1	1	-
Arthrobranchiae	r	2	2	2	2	2	1	-
Podobranchiae	-	1	-	-	-	-	-	-
Epipods	1	1	-	1	1	1 (-)	-	-
Exopods	1	1	1	s	s	r	v	v

Petasma symmetrical, semiclosed, with numerous processes and folds; dorsomedian lobule bearing one subdistally; dorsolateral lobule with one distally and ventrolateral lobule with two terminal ones; distal parts of three lobules firmly connected by convoluted membrane. Appendix masculina subovoid. Thelycum with single plate of sternite XIV raised in two pairs of lateral prominences disposed longitudinally (anterior pair columnar in shape and more prominent), both pairs separated by median groove, depression, or tubercles; median protuberance of sternite XIII strongly developed, more or less excavate posteromedially. Seminal receptacles consisting of pair of longitudinally or obliquely disposed sacs, opening by slits in groove between sternites XIV and XIII.

HELDT (1938a) and PÉREZ FARFANTE (1982) illustrated the seminal receptacles of *P. longirostris* and *P. politus* respectively. HELDT also described the spermatophore of the former

Source : MNHN, Paris

as consisting of a large slightly dorsoventrally depressed sperm mass containing strongly bound spermatozoids and enveloped by a thin membrane, and a non-cellular cushion-like flange narrowly attached to the sperm sac which is also accompanied by a gelatinous material.

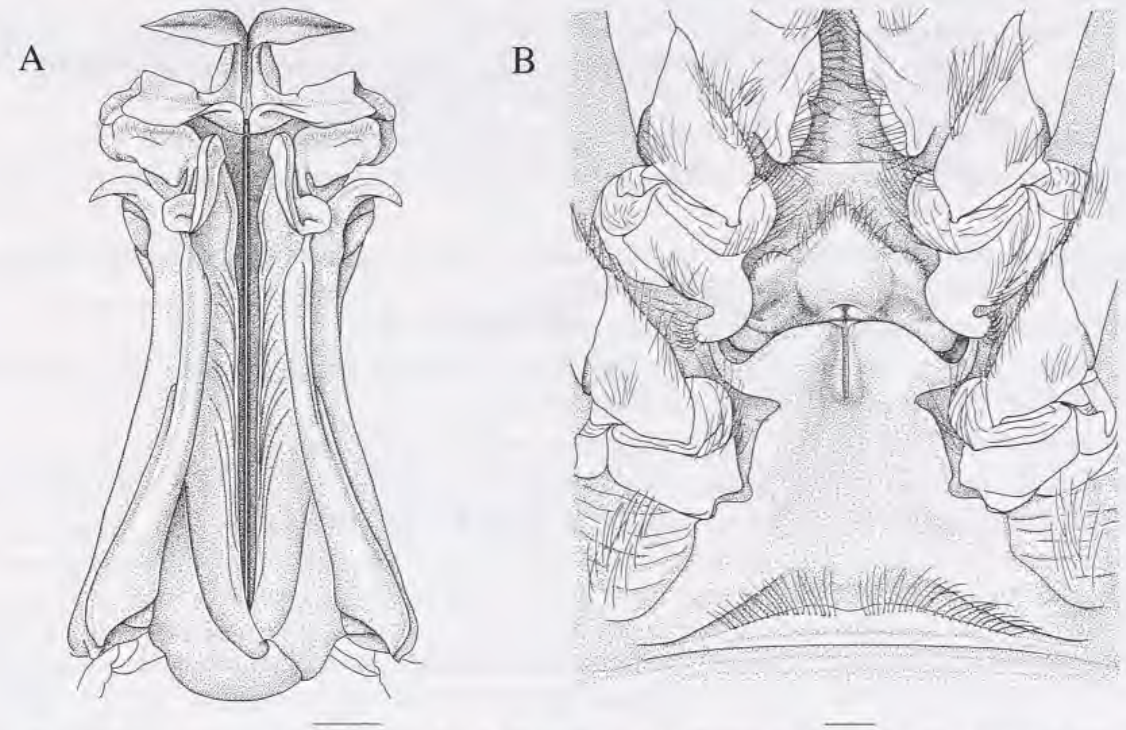


FIG. 73. — *Parapenaeus longirostris*: **A**, ♂ 33 mm cl, off Sicily, Mediterranean. Petasma, ventral view. — **B**, ♀ 34 mm cl, off Sicily, Mediterranean. Thelycum. Scales = 1 mm.

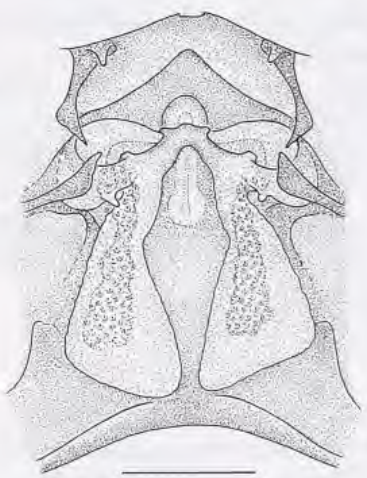


FIG. 74. — *Parapenaeus politus*, 20 mm cl, Sabanalarga, Colombia. Seminal receptacles, dorsal view. Scale = 2 mm. (From PÉREZ FARFANTE, 1982).

SPECIES. — *Parapenaeus americanus* Rathbun, 1901. Off New England; Gulf of Mexico; Bahamas; Cuba; Puerto Rico; St. Lucia; Belize; Brazil; Northern Uruguay.

Parapenaeus australiensis Dall, 1957. Indonesia; Philippines; Queensland, New South Wales, Australia; Fiji.

Parapenaeus australiensis forma *nodosa* Crosnier, 1986a. Philippines.

Parapenaeus fissuroides erythraeus Crosnier, 1986a. Red Sea.

Parapenaeus fissuroides fissuroides Crosnier, 1986a. Indonesia; South China Sea; Philippines; Hong Kong; Taiwan; Japan; Korea.

Parapenaeus fissuroides indicus Crosnier, 1986a. East coast of South Africa; Mozambique; Kenya; Zanzibar; Madagascar; Gulf of Oman.

Parapenaeus fissurus (Bate, 1881). East coast of South Africa to Zanzibar; Red Sea; Arabian Sea; India; Andaman Islands; Malaysia; Indonesia; Gulf of Tonkin; South China

Source : MNHN, Paris

Sea; Philippines; Taiwan; Japan; New Guinea; Wallis and Futuna Islands.

Parapenaeus investigatoris Alcock and Anderson, 1899. Natal, South Africa; Gulf of Aden; India; Andaman Islands; Malaysia; Indonesia; Philippines; Taiwan; Japan.

Parapenaeus lanceolatus Kubo, 1949. Indonesia; Vietnam; South China Sea; Philippines; Hong Kong; Taiwan; Japan; Korea; Western Australia.

Parapenaeus longipes Alcock, 1905. East coast of Africa from Tanzania to Somalia; Madagascar; Pakistan; West and South India; Sri Lanka; Indonesia; South China Sea; Philippines; Hong Kong; Taiwan; Japan; New Guinea.

Parapenaeus longipes forma *denticulata* Crosnier, 1986a. Indonesia; Philippines.

Parapenaeus longirostris (Lucas, 1846). Mediterranean; eastern Atlantic from Portugal to Namibia.

Parapenaeus murrayi Ramadan, 1938. East coast of South Africa; Mozambique; Zanzibar; Madagascar; Réunion; Indonesia; Philippines; Japan.

Parapenaeus perezfarfantae Crosnier, 1986a. Philippines.

Parapenaeus politus (Smith, 1881). Off New Jersey (south of Martha's Vineyard), south and along the Gulf of Mexico; Caribbean Sea to French Guiana.

Parapenaeus ruberoculatus Hall, 1962. Malaysia; Indonesia; Philippines.

Parapenaeus sextuberculatus Kubo, 1949. Madagascar; India; Indonesia; Gulf of Tonkin; South China Sea; Philippines; Taiwan; Japan; New South Wales, Australia.

Genus ***Pelagopenaeus*** Pérez Farfante & Kensley, new designation[3]

Figures 75-76

Peneus - Faxon, 1893, Bull. Mus. comp. Zool. Harv., 24(7): 211; 1895, Mem. Mus. comp. Zool. Harv., 18(15): 181. — Alcock, 1906, Cat. Indian Dec. Crust., 3(1): 49 [Placed in "uncertain or doubtful species" category].

Penaeus - Lenz and Strunck, 1914, Dt. Südpol.-Exped., 15 (zool. 7): 298.

Funchalia (Pelagopenaeus) Burkenroad, 1934b, Bull. Am. Mus. nat. Hist., 68(2): 73, 76; 1936b, Bull. Bingham oceanogr. Coll., 5(2): 136. — Ramadan, 1938, Sci. Rep. John Murray Exped., 5(3): 64.

Funchalia - Gordon and Ingle, 1956, J. mar. biol. Ass. U. K., 35: 476 [part]. — Dall, 1957, Aust. J. mar. Freshwat. Res., 8(2): 163 [part]. — Crosnier and Forest, 1973, Faune Trop., 29: 296 [part].

Pelagopenaeus - Grippa, 1976, Atti Soc. ital. Sci. nat., 117(3/4): 126; 1987, Investnes Pesq., 51 (Suppl. 1): 73. — Dall *et al.*, 1990, Adv. Mar. Biol., 27: 91.

Type Species: By present selection, *Penaeus balboae* Faxon, 1893, Bull. Mus. comp. Zool. Harv., 24(7): 211.

Type Locality: Off Isla del Coco, Costa Rica, 5°26'20"N, 86°55'00"W, 1280 m.

Gender: Masculine.

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[3] As Burkenroad proposed the name *Pelagopenaeus* for two species in 1934, i.e. after 1930, and did not select a type species, *Pelagopenaeus* is an unavailable name under Article 13b of the International Code of Zoological Nomenclature. Dr. L. Holthuis (in litt, 1996) notes further that the indication by W. L. Sclater [1935, Zoological Record for 1934, vol. 71, part 9 (Crustacea), page 34]: "*Pelagopenaeus* subg. n. for *Penaeus balboae* Faxon" is not a type selection either. Thus it is with the greatest reluctance, and in light of Dr. Burkenroad being deceased, that we make the name available and assume in this work the authorship of *Pelagopenaeus*.

Source : MNHN, Paris

FIG. 75. — *Pelagopenaeus balboae*, ♂ 28 mm cl, off Gulf of Panama. Lateral view. Scale = 10 mm.

DIAGNOSIS. — Integument minutely pubescent. Rostrum short, reaching to about midlength of second antennular segment; armed with dorsal and ventral teeth. Carapace lacking orbital spine (angle only occasionally slightly marked) and antennal spine, with pterygostomian and small hepatic spines, latter often indistinct in adults; postocular sulcus lacking; gastro-orbital carina, orbito-antennal, and cervical sulci absent; postrostral carina long and well marked; antennal carina clearly defined; elongate dorsolateral carina present; long hepatic carina joining long branchiocardiac; branchiostegal carina also long; without longitudinal and transverse sutures. Fourth through sixth abdominal somites each bearing single long, strong cicatrix. Telson with three pairs of fixed lateral spines preceded by numerous pairs of much smaller ones; lateral ramus of uropod armed with large lateral spine.

Antennule lacking parapenaeid spine; antennular flagella subfiliform, dorsal one longer than carapace and much longer than ventral. Mandibles with incisor processes short, straight; distal article of biarticulate palp small, symmetrical, triangular. Palp of first maxilla relatively short, slender, biarticulate, basal article armed with small proximolateral comb of short setae, subdistolateral row of spinules, and long subdistal spine on mesial margin; distal article bearing long apical setae. Dactyl of third maxilliped elongate and flat, slightly longer in females than in males. Ridge of lateral ramus of uropod produced into conspicuous spine. Basial and ischial spines on first and second pereopods.

Distribution of branchiae, epipods, and exopods in the genus *Pelagopenaeus*.

Somite	VII (Mxp1)	VIII (Mxp2)	IX (Mxp3)	X (P1)	XI (P2)	XII (P3)	XIII (P4)	XIV (P5)
Pleurobranchiae	-	-	1	1	1	1	1	1
Arthrobranchiae	r	2	2	2	2	2	1	-
Podobranchiae	-	1	-	-	-	-	-	-
Epipods	1	1	1	1	1	1	-	-
Exopods	1	1	1	1	1	1	1	1

Source : MNHN, Paris

Petasma semi-open, symmetrical, with lateral lobe not produced in free, distally directed projection. Appendix masculina suboval. Thelycum open, with deep anterior depression on sternite XIV flanked by pair of moderately large, semicircular flaps; sternite XIII with deeply excavate median protuberance delimiting depression on sternite XIV.

Spermatophores elongate-ovate in outline, and when attached to female are tightly held in place and partly covered by the thelycal flaps.

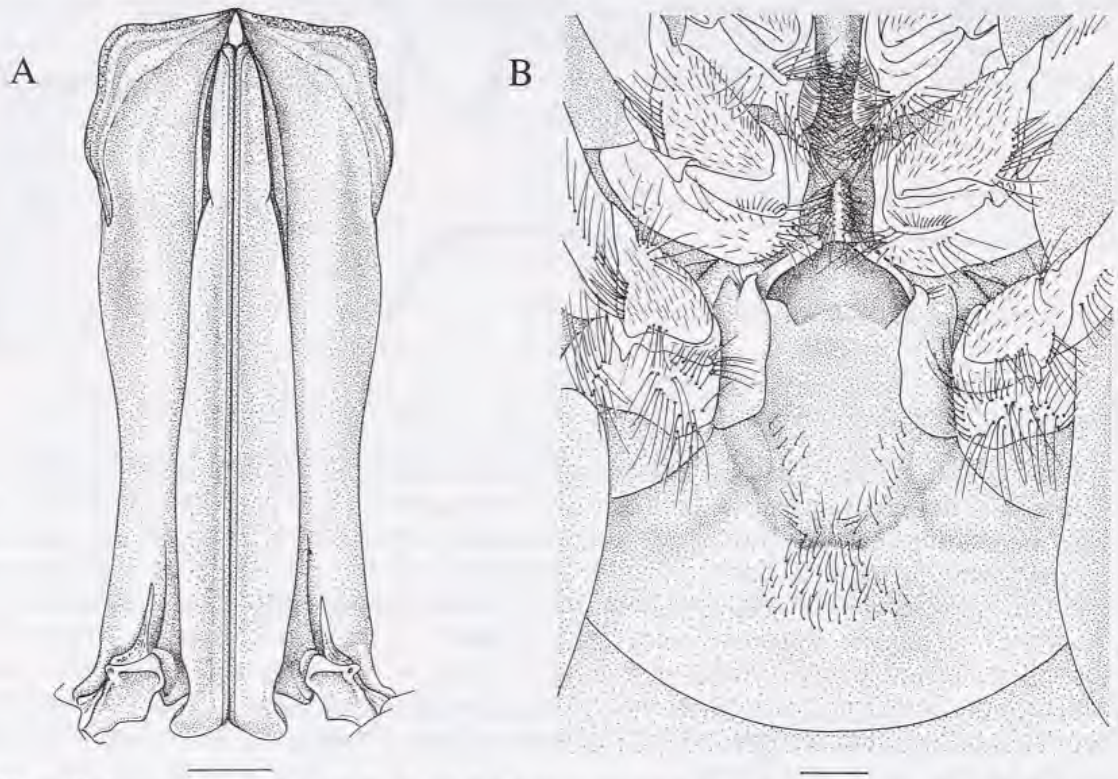

FIG. 76. — *Pelagopenaeus balboae*: **A**, ♂ 27.5 mm cl, Line Islands, east of Christmas Island. Petasma, dorsal view. — **B**, ♀ 31.5 mm cl, Line Islands, east of Christmas Island. Thelycum. Scales = 1 mm.

SPECIES. — *Pelagopenaeus balboae* (Faxon, 1893). Eastern Pacific Ocean off Gulf of Panama; Isla de Cocos; Caribbean; Bermuda; Equatorial mid-Atlantic; off Cape Verde Islands; eastern Atlantic Ocean off Congo; South-eastern Atlantic; Arabian Sea; north-west Pacific Ocean.

Genus ***Penaeopsis*** Bate, 1881

Figures 77-79

Penaeus - BATE, 1881, Ann. Mag. nat. Hist., (5)8: 173 [part].

Penaeopsis Bate, 1881, Ann. Mag. nat. Hist., (5)8: 182; 1888, Rep. scient. Results Voy. Challenger, 24: 273. — BOUVIER, 1905a, C. r. hebd. Séanc. Acad. Sci., Paris, 140: 981; 1908b, Bull. Inst. océanogr., Monaco, 119: 5. — SCHMITT, 1926, Zool. (biol.) Results Fish. Exp. 'Endeavour', 5(6): 319 [part]. — KUBO, 1949, J. Tokyo Coll. Fish., 36(1): 320. — PÉREZ FARFANTE, 1980a, Fish. Bull., U. S., 77(4): 722. — LIU and ZHONG, 1988, Penaeoid Shr. S. China Sea, : 83. — DALL *et al.*, 1990, Adv. Mar. Biol., 27: 91.

Placed on the Official List of Generic Names in Zoology, International Commission on Zoological Nomenclature, 1969, Opinion 864, Name No. 1821, Bull. zool. Nom., 25(4/5): 139.

Source : MNHN, Paris

Parapenaeus - SMITH, 1885b, Proc. U.S. natn. Mus., 8(11/12): 172 [part].
Metapenaeus - WOOD-MASON, 1891, Ann. Mag. nat. Hist., (6)8: 271 [part].
Peneus (Parapeneus) - ALCOCK, 1901, Descr. Cat. Indian Deep-sea Crust., : 14 [part].
Artemesia. - BOUVIER, 1905a, C. r. hebd. Séanc. Acad. Sci., Paris, 140: 982 [part].
Parapeneus - ALCOCK, 1905, Ann. Mag. nat. Hist., (7)16: 519 [part]; 1906, Cat. Indian Dec. Crust., 3(1): 30 [part].
Penaeopsis (Penaeopsis) - BURKENROAD, 1934a, Bull. Bingham oceanogr. Coll., 4(7): 4, 12.
Peneopsis - BURKENROAD, 1983, Crust. Issues, 1: 282.

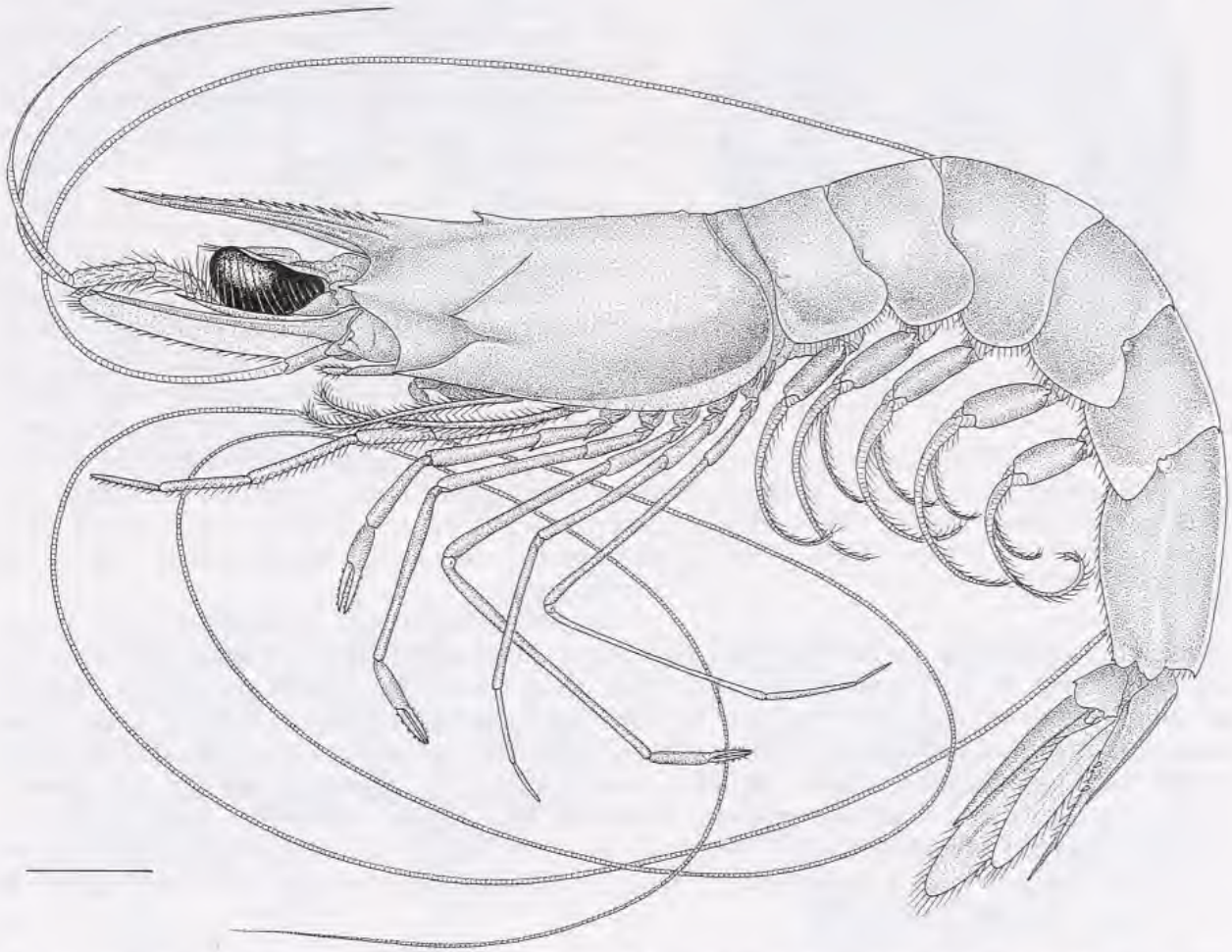

FIG. 77. — *Penaeopsis serrata*, ♀ 27 mm cl, west of Puerto Rico. Lateral view. Scale = 10 mm. (From PÉREZ FARFANTE, 1979).

TYPE SPECIES: By designation by BOUVIER, 1905a, *Penaeopsis serratus* Bate, 1881, Ann. Mag. nat. Hist., (5)8: 183, C. r. hebd. Séanc. Acad. Sci., Paris, 140: 981.

TYPE LOCALITY: Off Barbados, "Gulf of Mexico", 12°58'33"N, 59°36'45"W, 399 m. [Discussion of types in PÉREZ FARFANTE, 1980a: 760.]

GENDER: Feminine.

DIAGNOSIS. — Integument glabrous in appearance, various areas microscopically setose. Rostrum armed with dorsal teeth only, extending along its entire length; epigastric tooth

Source : MNHN, Paris

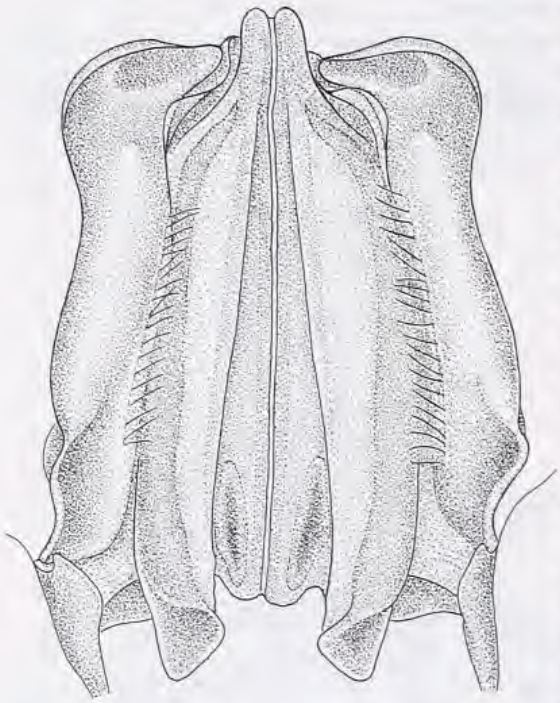

FIG. 78. — *Penaeopsis serrata*, ♂ 22 mm cl, Gulf of Mosquito, Panama. Petasma, dorsal view. Scale = 1 mm. (From PÉREZ FARFANTE, 1979).

conspicuously separated from first rostral tooth. Carapace with well developed antennal, pterygostomian, and hepatic spines, lacking orbital and branchiostegal spines; postocular sulcus lacking; cervical sulcus and carina well marked; hepatic sulcus with anterior part accompanied by sharp carina and descending from hepatic spine then turning toward and reaching pterygostomian spine, carina absent from posterior part; branchiocardiac carina variably developed, from long and strong to short; longitudinal and transverse sutures absent. Sixth abdominal somite bearing long, interrupted cicatrix. Telson armed with pair of moderately long, fixed, posterolateral spines preceded by two or three pairs of small, movable spines.

Antennule with long parapenaeid spine; antennular flagella long, 0.75 to almost twice length of carapace; ventral flagellum sexually dimorphic: in male shorter than dorsal and with proximal part forming rigid, flattened, strongly arched loop; in female straight and longer than dorsal. Palp of first maxilla entire, short, blunt or truncate distally, bearing weak (sometimes indistinct) proximolateral lobe, conspicuous proximomesial lobe, and slender distomesial spine. Basial spine on first pereopod, lacking on third maxilliped, second and third pereopods. Anterior arthrobranchia lacking on somite XIII.

Petasma symmetrical, semiclosed, with lateral lobes not produced distally into spoutlike projections. Appendix masculina jointed to dorsomesial rib of endopod, heavily sclerotized, wider than long. Thelycum closed, with single plate of sternite XIV occupying entire sternite and bearing variably developed median prominence; median protuberance of sternite XIII well developed. Seminal receptacles consisting of paired bilobed sacs (one large submedian, the other smaller extending laterally), each opening through single long slit located at anterior extremity of sternite XIV, at base of fourth pereopod.

The compound spermatophore of *Penaeopsis* is not as complex as those of members of genera with open thelyca (e.g. *Litopenaeus, Pleoticus*). PÉREZ FARFANTE (1980a) presented an illustration of that of *P. rectacuta*.

Distribution of branchiae, epipods, and exopods in the genus *Penaeopsis*.

Somite	VII (Mxp1)	VIII (Mxp2)	IX (Mxp3)	X (P1)	XI (P2)	XII (P3)	XIII (P4)	XIV (P5)
Pleurobranchiae	-	-	1	1	1	1	1	-
Arthrobranchiae	r	2	2	2	2	2	1	-
Podobranchiae	-	1	-	-	-	-	-	-
Epipods	1	1	-	1	1	1	-	-
Exopods	1	1	1	s	s	s	s	s

Source : MNHN, Paris

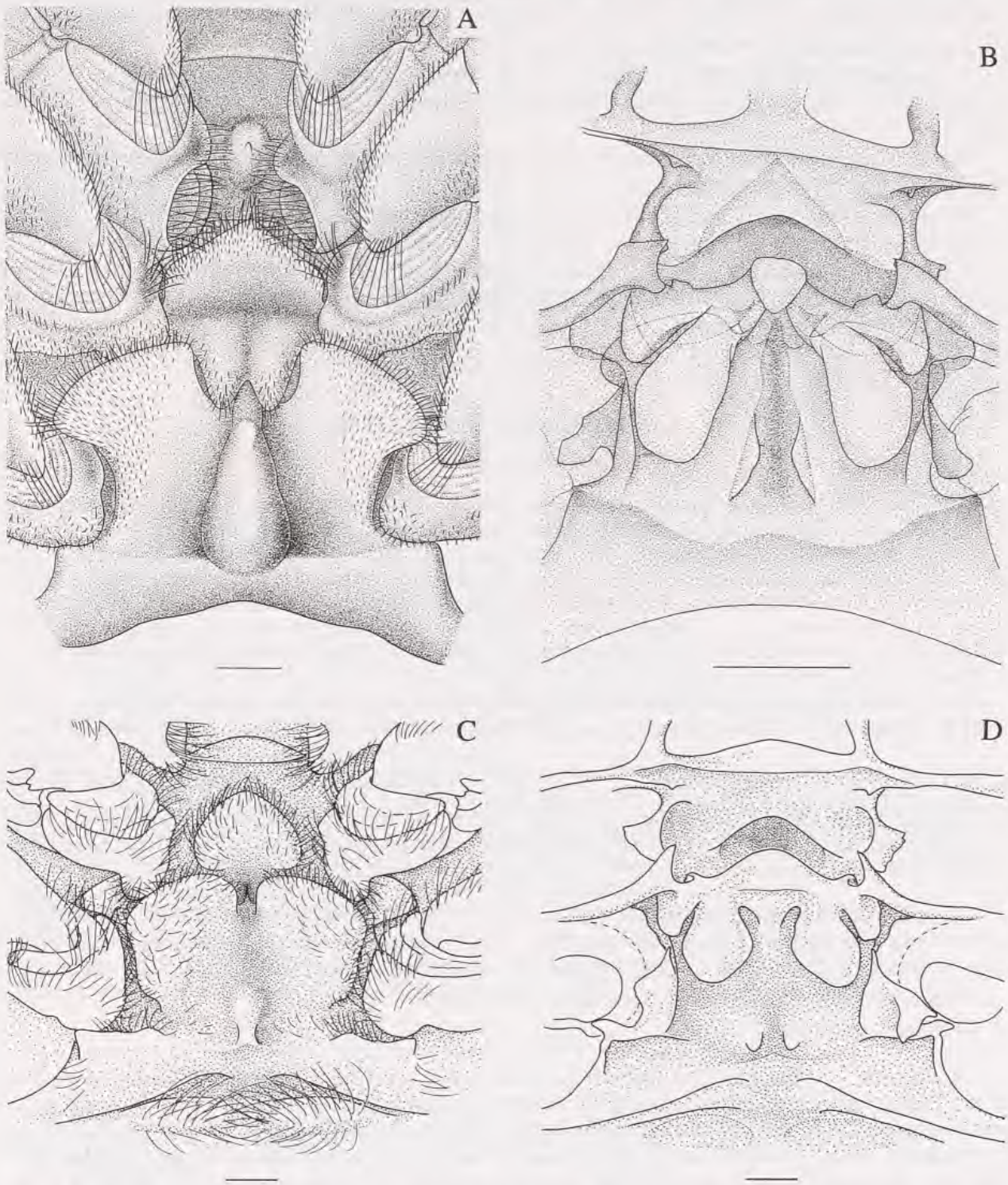

FIG. 79 A-B. — *Penaeopsis serrata*, ♀ 29.5 mm cl, Dry Tortugas Islands, Florida: **A**, Thelycum. Scale = 2 mm. **B**, Seminal receptacles, dorsal view. Scale = 1 mm. (From PÉREZ FARFANTE, 1979).

FIG. 79 C-D. — *Penaeopsis eduardoi*, ♀ 32.5 mm cl, southwest of Taiwan: **A**, Thelycum. Scale = 1 mm. **B**, Seminal receptacles, dorsal view. Scale = 1 mm.

Source : MNHN, Paris

SPECIES. — *Penaeopsis balssi* Ivanov and Hassan, 1976. East coast of South Africa; Mozambique; Kenya; Tanzania; Somalia; Madagascar; Saya de Malha Bank.

Penaeopsis challengeri De Man, 1911. Fiji; Wallis and Futuna Islands.

Penaeopsis eduardoi Pérez Farfante, 1977b. Mozambique; Madagascar; Réunion; Bay of Bengal; Indonesia; South China Sea; Philippines; Taiwan; Japan; New South Wales, Australia; Fiji.

Penaeopsis jerryi Pérez Farfante, 1979. Off Mozambique; Yemen; Gulf of Aden; Southwest and East India; off Andaman Islands.

Penaeopsis rectacuta (Bate, 1881). East coast of South Africa; Andaman Islands; Indonesia; South China Sea; Taiwan; Philippines; Japan; Fiji.

Penaeopsis serrata Bate, 1881. Western North Atlantic Ocean from New Jersey to Gulf of Mexico, Caribbean Sea to French Guiana; southern Brazil; eastern North Atlantic Ocean from southern Portugal to Mauritania.

Genus ***Penaeus*** Fabricius, 1798

Figures 80-81

Peneus Weber, 1795, Nomencl. Entomol. Sec. Ent. Syst. Illust., : 94 [nomen nudum, International Commission on Zoological Nomenclature, Opinion 104, Smithson. misc. Collns, 1928, 73(5): 25].

Penaeus Fabricius, 1798, Suppl. Entomol. Syst., : 408 [part]. — LATREILLE, 1803, Hist. nat. Crust. Ins., 6: 246 [part]; 1806, Gen. Crust. Ins., 1: 53; 1810, Consid. Génér. Crust. Arach. Ins., : 102, 422. — SMITH, 1885b, Proc. U. S. natn. Mus., 8(11/12): 170 [part]; 1886, Rep. U. S. Commnr Fish., for 1885: 684 [part]. — DE MAN, 1911, Siboga Exped., 39a: 95 [part]. — BURKENROAD, 1934b, Bull. Am. Mus. nat. Hist., 68(2): 73 [part]. — KUBO, 1949, J. Tokyo Coll. Fish., 6(1): 268 [part]. — DALL *et al.*, 1990, Adv. Mar. Biol., 27: 93 [part].

Placed on the Official List of Generic Names in Zoology, 1928, Smithson. misc. Collns, 73(5): 25.

Penoeus - LAMARCK, 1818, Hist. Nat. Anim. s. Vert., 5: 205. — LUCAS, 1840, Hist. nat. Crust. Arach. Myr., : 195.

Peneus - ALCOCK, 1901, Descr. Cat. Ind. Deep-Sea Crust., : 13 [part]; 1905, Ann. Mag. nat. Hist., (7)16: 513 [part]; 1906, Cat. Indian Dec. Crust., 3(1): 7 [part]. — BURKENROAD, 1983, Crust. Issues, 1: 282.

Penaeus (Penaeus) - PÉREZ FARFANTE, 1969, Fish. Bull., U. S., 67(3): 461. — BURUKOVSKY, 1972, Trudy AtlantNIRO, 42: 3, 5, 8, 13, 16. — MOTOH and BURI, 1984, Res. Crust., (13, 14): 24. — LIU and ZHONG, 1988, Penaeoid Shr. S. China Sea, : 104. — HAYASHI, 1992, Dendr. Crust. Japan. Waters, : 122.

TYPE SPECIES: By subsequent designation of LATREILLE, 1810, *Penaeus monodon* Fabricius, 1798, Suppl. Entomol. Syst., : 408; neotype for *Penaeus monodon*, Rijksmus. Nat. Hist., Leiden, designated by HOLTHUIS, 1949, Proc. K. ned. Akad. Wet., 52(9): 10.

TYPE LOCALITY: Bay of Batavia (= Jakarta), Indonesia.

GENDER: Masculine.

DIAGNOSIS. — Integument glabrous. Rostrum with dorsal and 2-4 (occasionally 5) ventral teeth, moderately long, in young slightly exceeding antennular peduncle, in adult reaching to about midlength of second antennular segment. Carapace with antennal and hepatic spines pronounced, lacking orbital and pterygostomian spines; postocular sulcus absent; cervical sulcus shallow; postrostral carina long, reaching almost to posterior margin of carapace; adrostral carina and sulcus short, extending only to about level of epigastric tooth; gastrofrontal carina absent; gastro-orbital carina short, orbito-antennal sulcus well marked, extending anteriorly not more than two-thirds of distance from hepatic spine to orbital margin; cervical and hepatic carinae well defined, cervical sulcus shallow; branchiocardiac carina lacking; longitudinal and transverse

Source : MNHN, Paris

sutures absent. Sixth abdominal somite bearing three cicatrices, lacking dorsolateral sulcus. Telson unarmed.

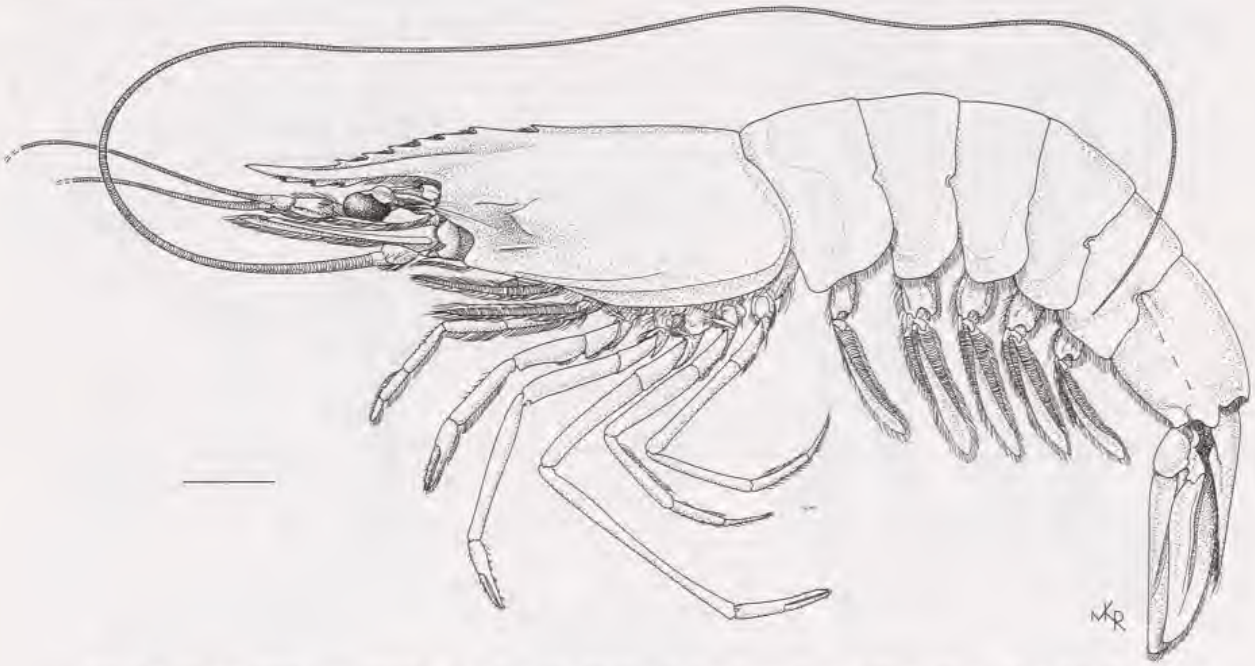

FIG. 80. — *Penaeus monodon*, ♀ 50 mm cl, Micaune, Mozambique. Lateral view. Scale = 10 mm.

Antennule lacking parapenaeid spine; antennular flagella shorter than carapace. Palp of first maxilla elongate, consisting of 2-5 articles, distal ones slender; large basal article produced into setose proximal lobule on lateral and mesial margins, bearing long subdistomesial spine and distolateral comb of small spinules. Basial spine on first and second pereopods. Exopod on fifth pereopod absent in *P. monodon*, unique in series.

Petasma symmetrical, semiclosed with distomedian projections quite short, ventral costae narrowly gaping or contiguous, long and strongly curved distally. Appendix masculina subelliptical, or suboval, armed with numerous marginal spines. Thelycum closed, with pair of lateral plates of sternite XIV meeting along midline, shielding simple median saclike seminal receptacle; sternite XIII with well developed median protuberance.

Spermatophores lacking attachment structures. Observations by MALEK and BAWAB (1974a, b), CHAMPION (1987), and BAUER and CASH (1991), on the formation and structure of the spermatophore in other closed thelycum species previously included in *Penaeus* s.l. (*Farfantepenaeus, Fenneropenaeus, Melicertus)* indicate that they may be similar in all of them.

Distribution of branchiae, epipods, and exopods in the genus *Penaeus*.

Somite	VII (Mxp1)	VIII (Mxp2)	IX (Mxp3)	X (P1)	XI (P2)	XII (P3)	XIII (P4)	XIV (P5)
Pleurobranchiae	-	-	1	1	1	1	1	1
Arthrobranchiae	r	2	2	2	2	2	1	-
Podobranchiae	-	1	-	-	-	-	-	-
Epipods	1	1	1	1	1	1	-	-
Exopods	1	1	1	1	1	1	1	1 (-)

Source : MNHN, Paris

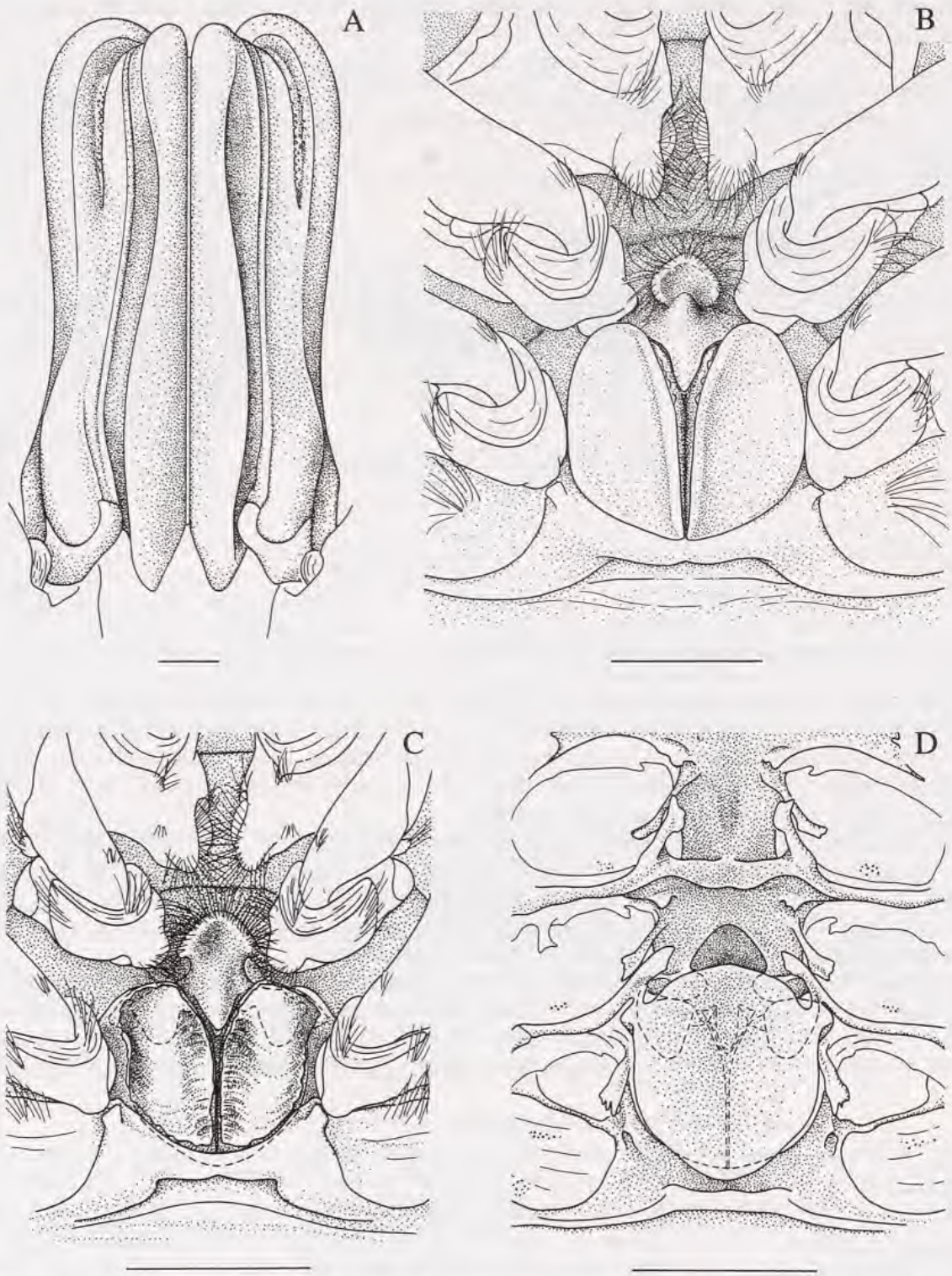

FIG. 81. — *Penaeus monodon*: **A**, ♂ 54 mm cl, Indian Ocean. Petasma, dorsal view. Scale = 1 mm. — **B**, ♀ 50 mm cl, Micaune, Mozambique. Thelycum. Scale = 5 mm. — **C-D**, ♀ 35 mm cl, Parati Taoch, Palau Islands. **C**, Seminal receptacle, ventral view (lateral plates of thelycum removed). **D**, Seminal receptacle, dorsal view. Scales = 5 mm.

Source : MNHN, Paris

SPECIES. — *Penaeus esculentus* Haswell, 1879. Western Australia, Northern Territory, Queensland to New South Wales, Australia.

Penaeus monodon Fabricius, 1798. East coast of Africa; Red Sea; Madagascar; Mauritius; Réunion; Pakistan; India; Sri Lanka; Malaysia; Singapore; Indonesia; China; Philippines; Hong Kong; Taiwan; Japan; Korea; New Guinea; Western Australia to Queensland, Australia; Fiji.

Penaeus semisulcatus De Haan, 1844. Eastern Mediterranean; east coast of Africa; Red Sea; Madagascar; Persian Gulf; Pakistan; India; Sri Lanka; Malaysia; Indonesia; South China Sea; Philippines; Hong Kong; Taiwan; Japan; Korea; New Guinea; Western Australia, Northern Territory, Queensland, New South Wales, Australia; Fiji.

Genus ***Protrachypene*** Burkenroad, 1934

Figures 82-84

Protrachypene Burkenroad, 1934a, Bull. Bingham oceanogr. Coll., 4(7): 43; 1983, Crust. Issues, 1: 280. — DALL *et al.*, 1990, Adv. Mar. Biol., 27: 99.

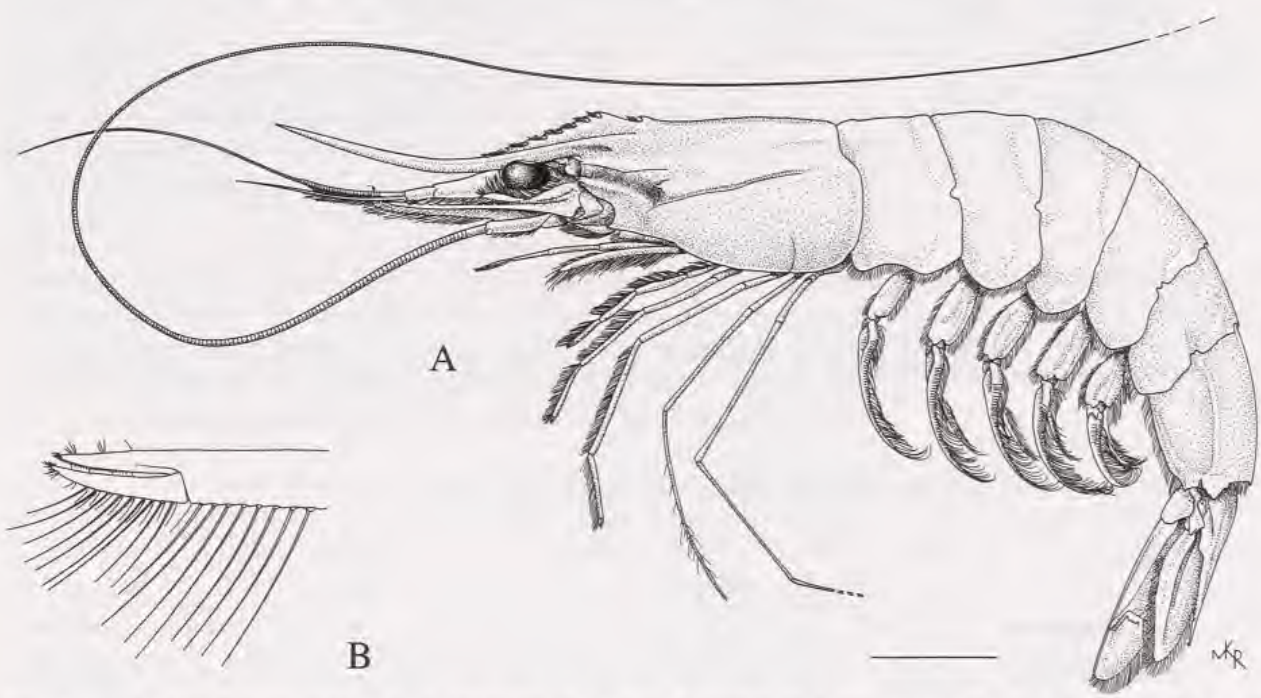

FIG. 82. — *Protrachypene precipua*, ♀ 24.5 mm cl, Playas, Ecuador: **A**, Lateral view. Scale = 1 mm. **B**, Chela of pereopod 1 enlarged.

TYPE SPECIES: By monotypy, *Protrachypene precipua* Burkenroad, 1934a, Bull. Bingham oceanogr. Coll., 4(7): 43.

TYPE LOCALITY: Bella Vista Beach, Panama City, Panama.

GENDER: Feminine.

DIAGNOSIS. — Integument pubescent. Rostrum bearing dorsal teeth only, limited to base, very long, considerably overreaching antennular peduncle; epigastric tooth distinctly separated from first rostral tooth. Carapace with orbital angle well marked, well developed antennal and hepatic

Source : MNHN, Paris

spines; pterygostomian angle produced but without spine; postocular sulcus well marked; gastrofrontal carina lacking; orbital-antennal sulcus deep; cervical sulcus short, shallow, without accompanying carina; hepatic carina short, merging with extremely strong branchiocardiac carina; longitudinal and transverse sutures present. Sixth abdominal somite bearing strong, long cicatrix. Telson armed with eight or more minute, movable, lateral spines.

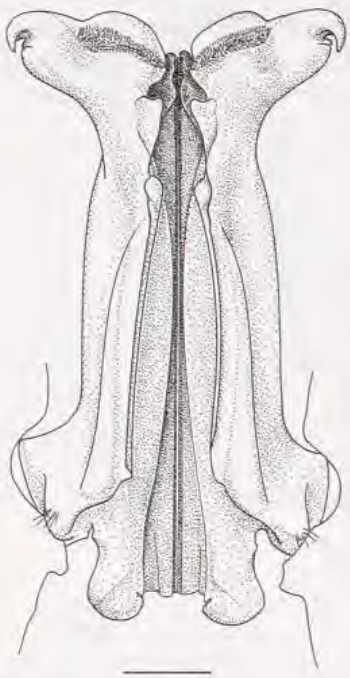

FIG. 83. — *Protrachypene precipua*, ♂ 24.5 mm cl, Playas, Ecuador. Petasma, ventral view. Scale = 1 mm.

Antennule lacking parapenaeid spine; antennular flagella unequal in length, dorsal flagellum considerably longer than both ventral one and carapace. Palp of first maxilla biarticulate, basal article tapering to minute distal one, and produced into weak proximolateral, large proximomesial, and quite small mediodistal lobules, latter bearing strong spine; palp also bearing row of spines on midlateral margin. First three pereopods with weak extremely elongate chela, lengthened propod and very short dactyl, less than half propod (in juveniles chelae of normal form); fourth and fifth pereopods very long and extremely slender, subflagelliform. Long basial spine on first pereopod and spine or minute protuberance on basis of second. Exopod absent on second maxilliped.

Petasma symmetrical, semiclosed, depressed, with lateral lobes produced distolaterally in broad horns; ventrolateral lobule terminating in subcircular flap overlapping or surpassing dorsolateral lobule. Appendix masculina subrectangular, almost as wide as long and strongly concave ventrally. In female, endopod of first pleopod absent. Thelycum closed, with single plate of sternite XIV conspicuously cleft anteriorly, produced into rounded anterolateral lobules, their anteromesial margins bordering grooves (sternal invaginations), leading to relatively shallow median pocket. Median protuberance of sternite XIII roughly triangular, with anterior margin broadly curved or trilobed, narrowing posteriorly toward median pocket; latter supported laterally by paired heavily sclerotized, convoluted lamellae. Seminal receptacles large, bladderlike, opening on anterolateral extremities of grooves.

Distribution of branchiae, epipods, and exopods in the genus *Protrachypene*.

Somite	VII (Mxp1)	VIII (Mxp2)	IX (Mxp3)	X (P1)	XI (P2)	XII (P3)	XIII (P4)	XIV (P5)
Pleurobranchiae	-	-	1	1	1	1	-	-
Arthrobranchiae	r	2	2	2	2	2	1	-
Podobranchiae	-	1	-	-	-	-	-	-
Epipods	1	1	-	1	1	1	-	-
Exopods	1	-	1	1	1	1	1	1

Spermatophores apparently entering median pocket with sperm mass passing to seminal receptacles, and trailing sperm-free material plugging pocket. As noted by BURKENROAD (1934a) the plug blocks the entrance and the sperm is forced to leave the receptacle through the laterally located slits at the base of the fourth pereopods, close to the gonopores. In general, this seems to be the method of impregnation and release of sperm in members of the genera of the *Trachypenaeus* 'series'.

Source : MNHN, Paris

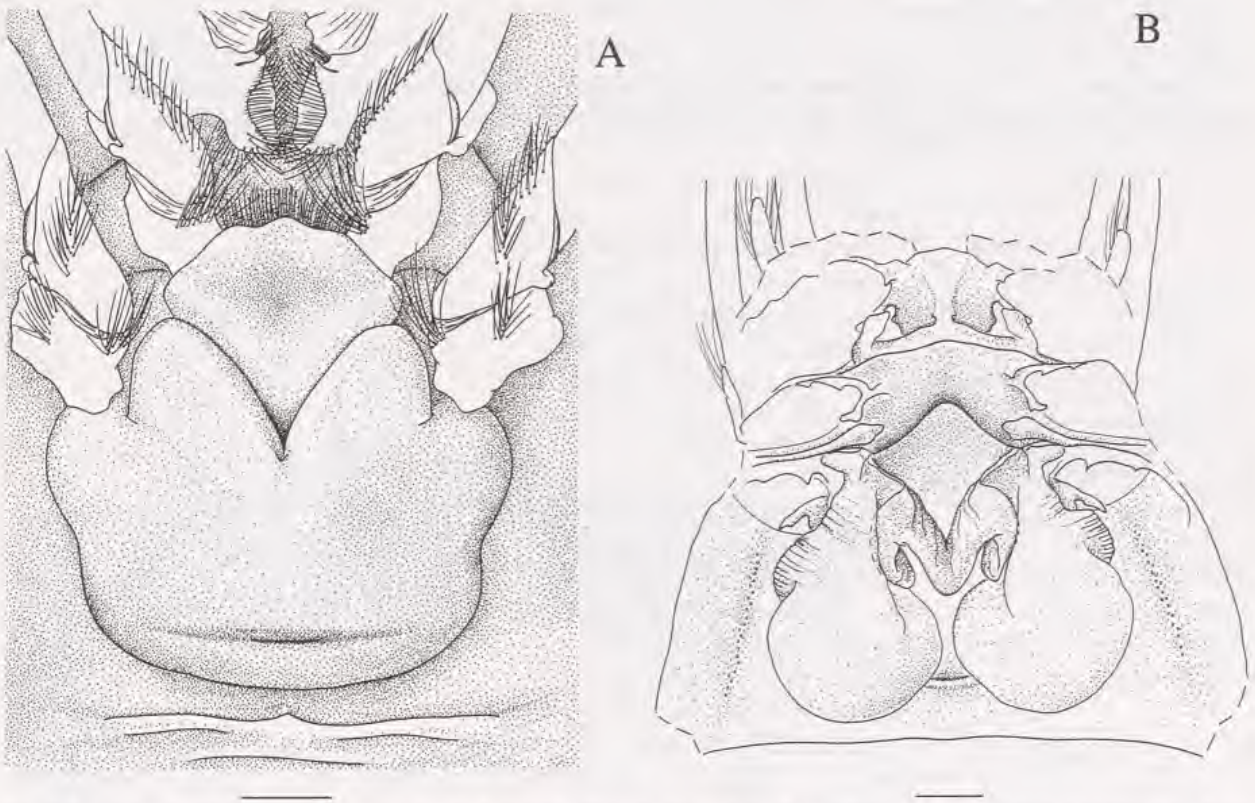

FIG. 84. — *Protrachypene precipua*, ♀ 24.5 mm cl, Playas, Ecuador: **A**, Thelycum. **B**, Seminal receptacles, dorsal view. Scales = 1 mm.

SPECIES. — *Protrachypene precipua* Burkenroad, 1934a. El Salvador to Northern Peru.

Genus ***Rimapenaeus***, new genus

Figures 85-87

Penaeus - STIMPSON, 1874, Ann. Lyc. nat. Hist. N.Y., 10: 135 [description of *Penaeus constrictus* only].
Parapenaeus - SMITH, 1885b, Proc. U. S. natn. Mus., 8(11/12): 170 [part].
Peneus (Trachypeneus) - ALCOCK, 1901, Descr. Cat. Indian Deep-Sea Crust., : 15 [part].
Trachypeneus - ALCOCK, 1905, Ann. Mag. nat. Hist., (7)26: 522 [part]. — BURKENROAD, 1983, Crust. Issues, 1: 283 [part].
Trachypeneus (Trachysalambria) - BURKENROAD, 1934a [September], Bull. Bingham oceanogr. Coll., 4(7): 49 [Division I, Section 1].
Trachypeneus - BURKENROAD, 1934b [December], Bull. Am. Mus. nat. Hist., 68(2): 94 [Division 1, Section 1].
Trachypenaeus - DALL, 1957, Aust. J. mar. Freshwat. Res., 8(2): 202 [part]. — PÉREZ FARFANTE, 1971b, Fish. Bull. U.S., 69(3): 365 [part]. — DALL *et al.* 1990, Adv. Mar. Biol., 27: 102 [part].

TYPE SPECIES: *Trachypenaeus faoe* Obarrio, 1954, in Segundo Centro Latinoamericano de Capacitación Pesquera (= CLACP, FAO), Tr. 41: 3[a]. Lectotype, here designated, USNM 256545.

Source : MNHN, Paris

TYPE LOCALITY: Off Panama, 12 m.
GENDER: Masculine.

ETYMOLOGY. — From the Greek *rima*, cleft, in combination with the generic name *Penaeus*, alluding to the conspicuously or more often, deeply cleft thelycal plate of sternite XIV.

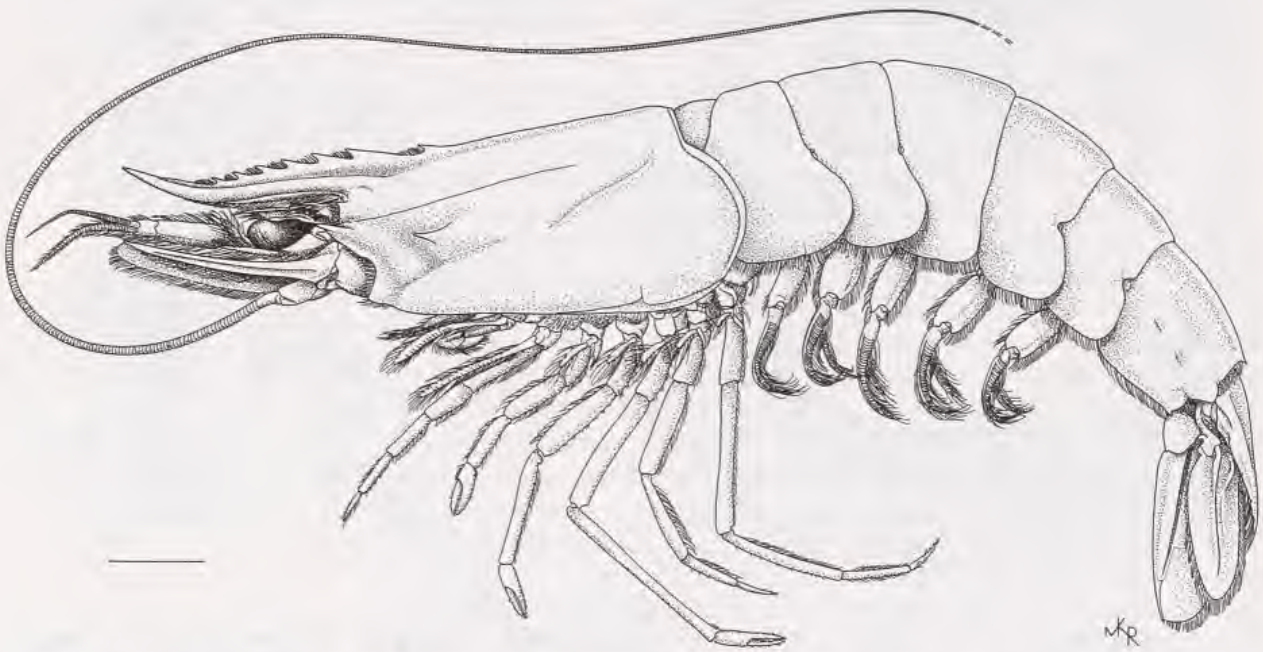

FIG. 85. — *Rimapenaeus faoe*, ♀ 37 mm cl, off Juan Díaz, Gulf of Panama. Lateral view. Scale = 10 mm.

DIAGNOSIS. — Body thickset. Integument thick, pubescent, usually densely so. Rostrum reaching between distal margin of first antennular segment and about proximal fourth of dorsal flagellum; armed with dorsal teeth only; epigastric tooth distinctly separated from first rostral tooth. Carapace with orbital, antennal, and hepatic spines present; pterygostomian angle blunt, lacking spine; postocular sulcus clearly distinct; short cervical and well marked hepatic sulcus; orbito-antennal sulcus weak; branchiocardiac carina well defined, accompanying sulcus almost indistinct; longitudinal suture long, ending well posterior to epigastric tooth; transverse suture well marked. Abdomen with sixth somite bearing one continuous cicatrix or latter more often divided into two well defined parts. Telson with 3-4 pairs of movable lateral spines, or 3 movable and subapical fixed, subapical pair projecting from slight shoulder, or unarmed (in *Rimapenaeus byrdi* only).

Antennule lacking parapenaeid spine, antennular flagella shorter than carapace. Palp of first maxilla entire, rapidly tapering to produced apex, bearing setose proximolateral, broad, setose proximomesial, and small acute distomesial lobules, latter bearing 5 elongate spines; palp also armed distally with ventrolateral rows of spinules. Fourth and fifth pereopods with dactyl neither elongate nor subdivided. Basial spine on third maxilliped, first and second pereopods; ischial spine lacking on first pereopod. Epipod on first through third pereopods.

Petasma symmetrical, semi-closed, with lateral lobes produced distolaterally into large, occasionally small (in *R. byrdi* only) hornlike projections either extending straight laterally or sinuously curving forward. Appendix masculina subrectangular with rounded corners. Thelycum closed, with plate of sternite XIV entirely cleft medially, resulting in two truncate flaps or, more

Source : MNHN, Paris

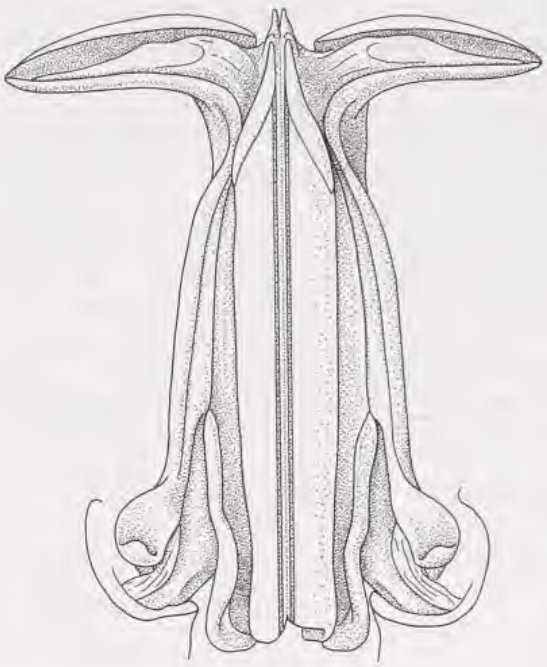

FIG. 86. — *Rimapenaeus faoe*, ♂ 20 mm cl, Bellevista Beach, Panama. Petasma, dorsal view. Scale = 1 mm.

often, deeply cleft anteriorly, and produced into moderately to strongly elongate, tongue-like flaps; sternal invagination forming pronounced median pocket dorsally continuous with median protuberance of sternite XIII; latter strongly developed, but not produced caudally. Seminal receptacles consisting of paired trilobed sacs, each with large posterior lobe and two small lobes, one lateral, another mesial, flanking median protuberance; sinuous slitlike openings of receptacles lying on anterior extremity of posterior lobe connecting mesially with median pocket and extending to anterolateral lobe (dorsal to posterolateral part of median protuberance), where opening to exterior near base of fourth pereopod. A general description of the seminal receptacles of *Trachypenaeus [Rimapenaeus] similis* was presented by BURKENROAD (1934b) and recently, BAUER and LIN (1993) conducted a thorough investigation of these structures, resulting in an excellent and finely illustrated contribution. Years before, PÉREZ FARFANTE (1971b) described and depicted the seminal receptacles of *T. [R.] fuscina*.

Material leaving the ejaculatory duct, i.e. the spermatophore, consists of numerous minute packets of sperm (spermatophores sensu BURKENROAD, 1934b, BAUER and LIN, 1993) in a seminal fluid and a viscous adhesive material, the plug substance. Apparently, during copulation the spermatophores are introduced into the seminal receptacles and the trailing plug substance fills and seals the median pocket where it hardens considerably. This arrangement prevents sperm from flowing back to the median pocket, forcing it to exit close to the gonopores. Earlier, BURKENROAD (1934a) had inferred the differing places of entrance and exit of the sperm in members of *Trachypenaeus* s.l. and later (1934b) described the transit of the sperm mass in *Trachypenaeus [Rimapenaeus] similis*, and the role of the trailing material. BAUER and LIN (1993: 184) also discuss the role of the plug substance as a mechanism to preclude subsequent inseminations by other males.

Distribution of branchiae, epipods, and exopods in the genus *Rimapenaeus*.

Somite	VII (Mxp1)	VIII (Mxp2)	IX (Mxp3)	X (P1)	XI (P2)	XII (P3)	XIII (P4)	XIV (P5)
Pleurobranchiae	-	-	1	1	1	1	-	-
Arthrobranchiae	r	2	2	2	2	2	1+v	-
Podobranchiae	-	1	-	-	-	-	-	-
Epipods	1	1	-	1	1	1	-	-
Exopods	1	1	1	1	1	1	1	1

REMARKS. — *Rimapenaeus*, one of the genera that has been segregated from *Trachypenaeus* s.l., includes some of the species (all from American waters) grouped by BURKENROAD (1934a) in

Source : MNHN, Paris

the subgenus *Trachysalambria* (Section 1, Division I). This genus can be distinguished by the thelycum which exhibits the plate of sternite XIV either divided in two by a longitudinal slit separating truncate plates or, more often, produced in relatively short or elongate tonguelike flaps, with sternite XIV typically invaginated anteriorly forming a well defined median pocket, instead of a broad bracket-shaped transverse groove. *Rimapenaeus* can also be distinguished by the petasma, the lateral lobes of which are distally produced into usually large, occasionally small, projections, extending laterally, often in a sinuous course with apical parts curving forward. The longitudinal suture is long, conspicuously overreaching the hepatic spine, rather than short, not extending behind the hepatic spine, and a basial spine is present on the third maxilliped. The seminal receptacles are trilobed, whereas in the other three genera they are bilobed. Finally, in *Rimapenaeus* the openings of the receptacles are mesially connected to a median pocket, and from there extend anterolaterally. Although in species of the other genera (*Megokris, Trachypenaeus, Trachysalambria*) formerly included in *Trachypenaeus* s.l. the epipods may be present on, or absent from, the first and second pereopods (in all four genera an epipod is always present on the third), all observations to the present indicate that in *Rimapenaeus* they are always present.

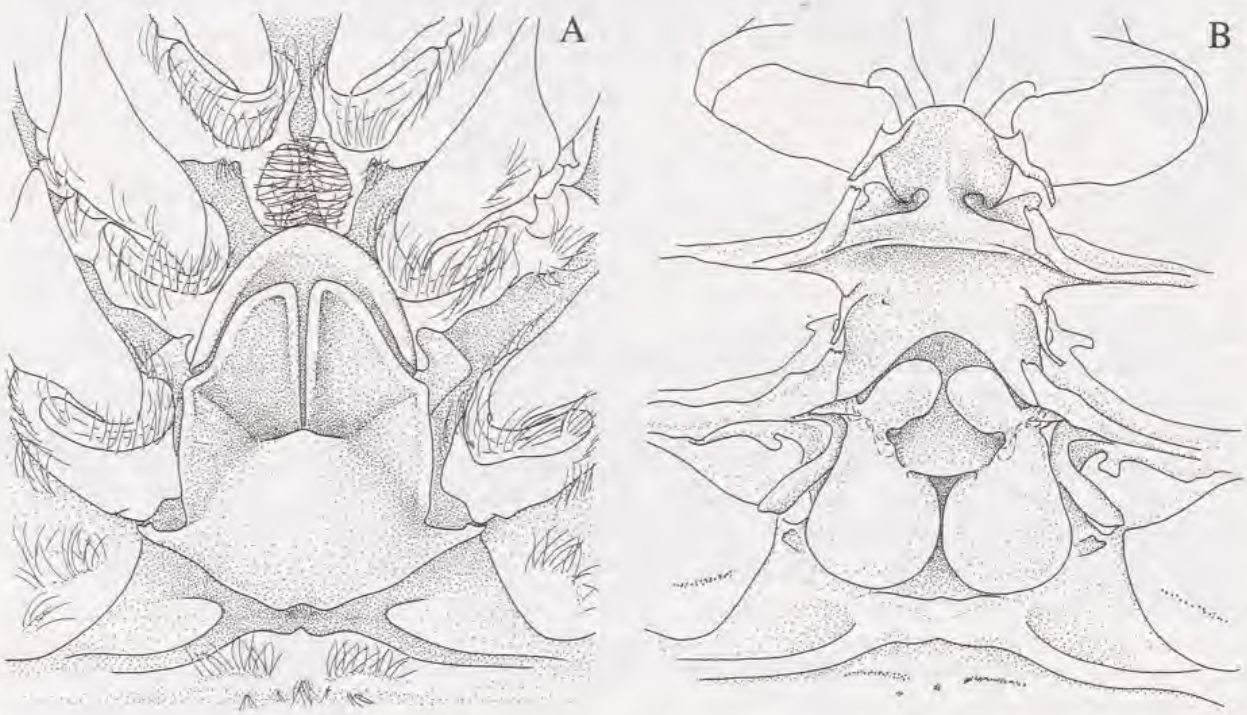

FIG. 87. — *Rimapenaeus faoe*, ♀ 34 mm cl, Tortugas grounds, south of Buenaventura, Colombia: **A**, Thelycum. **B**, Seminal receptacles, dorsal view. Scales = 1 mm.

SPECIES. — *Rimapenaeus byrdi* (Burkenroad, 1934a). Southern Gulf of California off Isla Altamura, Sinaloa, Mexico; Guatemala; Panama; Golfo de Guayaquil, Ecuador; Colombia; to Paita, northern Peru.

Rimapenaeus constrictus (Stimpson, 1874). Nova Scotia; Chesapeake Bay to Florida Keys, Gulf of Mexico; Caribbean Sea to Bahia de Zimbros, Brazil; Bermuda.

Rimapenaeus faoe (Obarrio, 1954). From southern Gulf of California to Golfo de Guayaquil, Ecuador.

Source : MNHN, Paris

Rimapenaeus fuscina (Pérez Farfante, 1971b). From Golfo de Tehuantepec, Mexico, to Paita, northern Peru.

Rimapenaeus pacificus (Burkenroad, 1934a). South of Punta San Felipe, northwest of Baja California, and Gulf of California, Mexico, to Huacho, Peru.

Rimapenaeus similis (Smith, 1885b). Florida Keys, Gulf of Mexico; Caribbean Sea to Sao Paulo, Brazil.

Genus ***Tanypenaeus*** Pérez Farfante, 1972

Figures 88-90

Tanypenaeus Pérez Farfante, 1972, Bull. mar. Sci. Gulf Caribb., 22: 186. — DALL *et al.*, 1990, Adv. Mar. Biol., 27: 99.

TYPE SPECIES: By original designation, *Tanypenaeus caribaeus* Pérez Farfante, 1972, Bull. mar. Sci. Gulf Caribb., 22(1): 187.

TYPE LOCALITY: Off Punta Faro, Colombia, 11°08'N, 74°47'W, 155-157 m.

GENDER: Masculine.

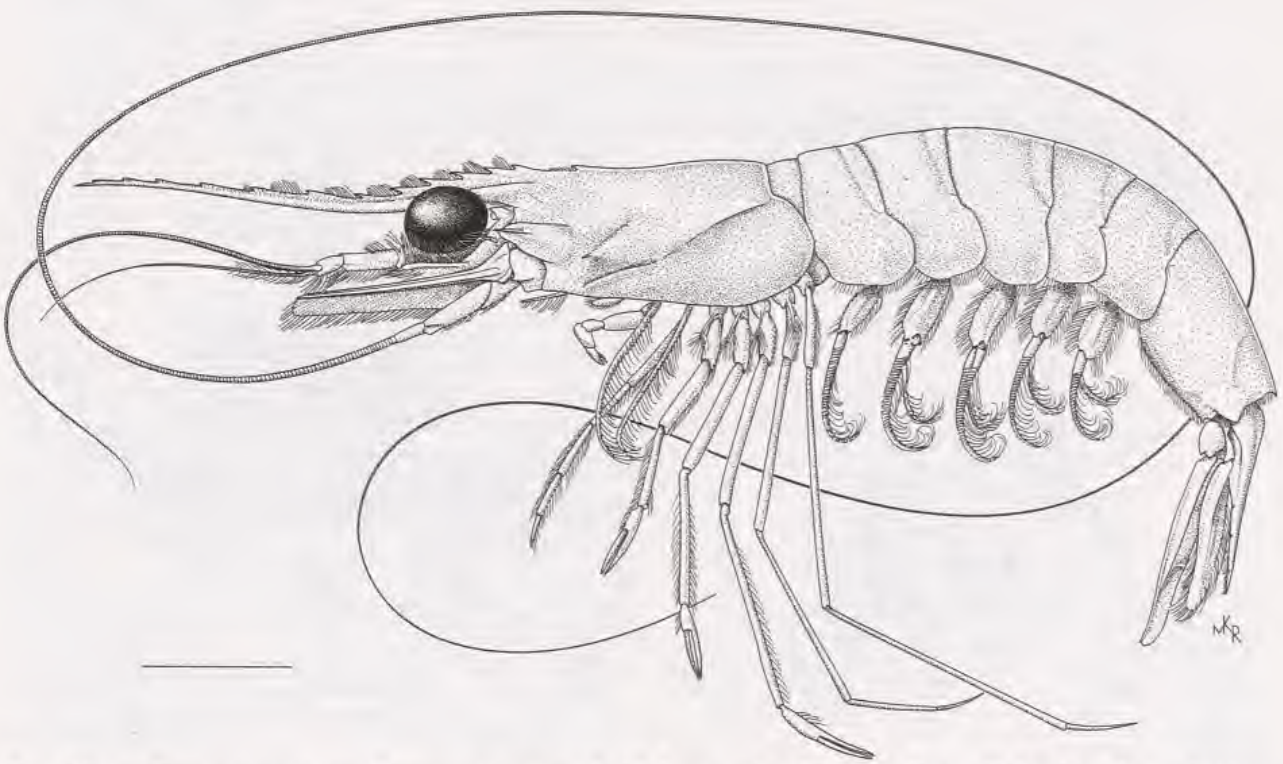

FIG. 88. — *Tanypenaeus caribaeus*, paratype, ♀ 18.5 mm cl, off Punta Faro, Colombia. Lateral view. Scale = 10 mm.

DIAGNOSIS. — Integument pubescent. Rostrum pronouncedly elongate, with dorsal teeth only, extending along entire length; epigastric tooth distinctly separated from first rostral tooth. Carapace with minute orbital, well developed antennal and hepatic spines; pterygostomian spine

Source : MNHN, Paris

lacking; postocular sulcus clearly distinct; gastro-orbital carina and orbito-antennal sulcus absent; cervical sulcus relatively long but weak, without accompanying carina; hepatic carina and sulcus present; branchiocardiac carina well developed; longitudinal suture well marked, transverse suture lacking. Sixth abdominal somite without cicatrix. Telson armed with movable, lateral spines.

Antennule lacking parapenaeid spine; antennular flagella filiform, markedly unequal in length, both longer than carapace. Palp of first maxilla entire, broad, bearing small proximolateral lobule, large on proximomesial margin, and acute spine accompanied by rigid setae on distomesial margin. Fourth and fifth pereopods subflagelliform with entire dactyls (differing from those of *Xiphopenaeus* in which they are multiarticulate). Basial spine on first and second pereopods and on ischium of first.

Distribution of branchiae, epipods, and exopods in the genus *Tanypenaeus*.

Somite	VII (Mxp1)	VIII (Mxp2)	IX (Mxp3)	X (P1)	XI (P2)	XII (P3)	XIII (P4)	XIV (P5)
Pleurobranchiae	-	-	1	1	1	1	-	-
Arthrobranchiae	r	2	2	2	2	2	1+r	-
Podobranchiae	-	1	-	-	-	-	-	-
Epipods	1	1	-	1	1	1	-	-
Exopods	1	1	1	1	1	1	1	v

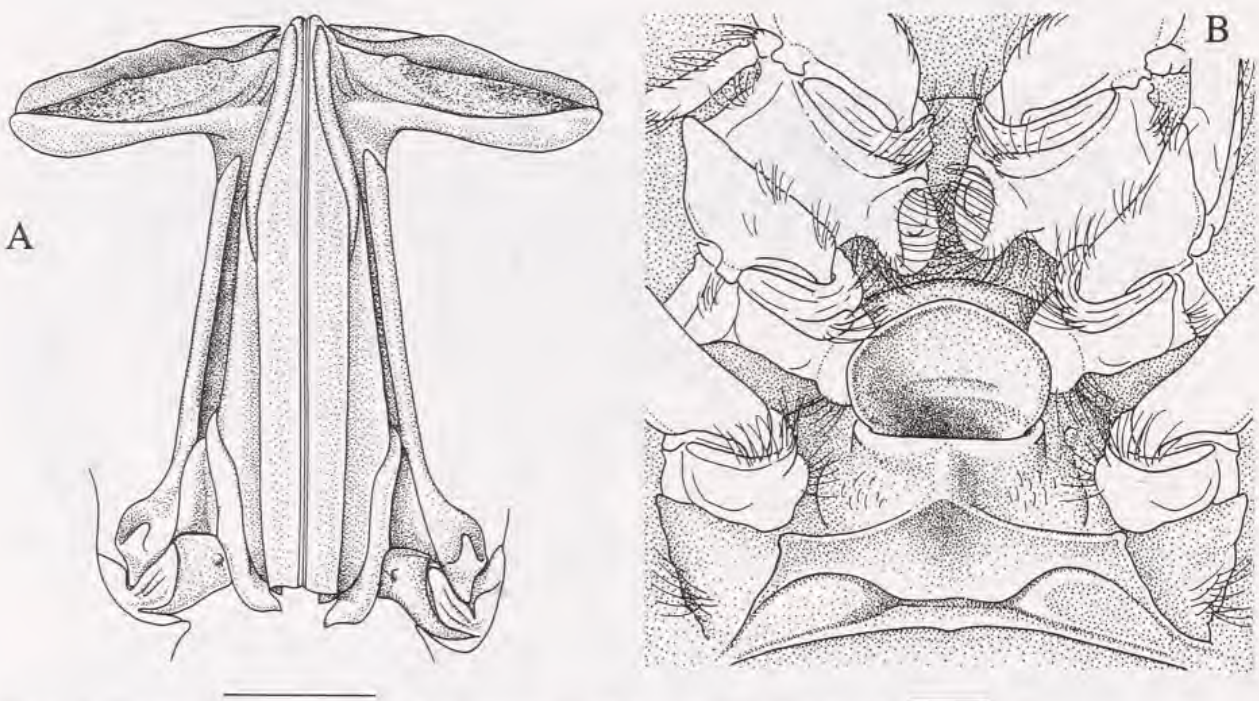

FIG. 89. — *Tanypenaeus caribaeus*: **A**, Paratype, ♂ 18 mm cl, off Punta Faro, Colombia. Petasma, dorsal view. — **B**, Holotype, ♀ 21 mm cl, off Punta Faro, Colombia. Thelycum. Scales = 1 mm.

Petasma symmetrical, semiclosed, produced distolaterally into pair of broad hornlike projections. Appendix masculina thick, almost subglobular, about as wide as long. Thelycum

Source : MNHN, Paris

closed, with single plate of sternite XIV not produced into paired flaps, forming anteriorly shallow pocket with relatively long and deeply excavate median protuberance of sternite XIII. Seminal receptacles consisting of paired trilobed sacs: large posterior lobe and two anterior lobes, one directed mesially, other laterally; sacs opening by slits on anterolateral extremities of sternite XIV.

A detailed account and figures of the seminal receptacles were given by PÉREZ FARFANTE (1972).

SPECIES. — *Tanypenaeus caribaeus* Pérez Farfante, 1972. Off Colombia, western Atlantic Ocean.

Genus ***Trachypenaeopsis*** Burkenroad, 1934

Figures 90-92

Penaeus - MIERS, 1884, Rep. Voy. Alert zool. Coll., : 564.

Penaeopsis - DE MAN, 1911, Siboga Exped., 39a: 53 [part].

Metapenaeus - RATHBUN, 1906, Bull. U. S. Fish Comm., 23(3): 904 [part]; 1915, Proc. biol. Soc. Wash., 28: 117; 1920, Rapp. Betref. Vissch. Kol. Curaçao, II, 2: 320 [part].

Trachypeneopsis Burkenroad, 1934a, Bull. Bingham Oceanogr. Coll., Yale Univ., 4(7): 40. — KUBO, 1949, J. Tokyo Coll. Fish., 36(1): 361. — BURKENROAD, 1983, Crust. Issues, 1: 282. — DALL *et al.*, 1990, Adv. Mar. Biol., 27: 100.

Trachypenaeopsis [emendment of *Trachypeneopsis* Burkenroad, 1934a, under the plenary powers by the International Commission of Zoological Nomenclature, 1969, Opinion 864, Bull. zool. Nom., 25(4/5): 139]. Placed on the Official List of Generic Names in Zoology, International Commission on Zoological Nomenclature, 1969, Opinion 864, Name No. 1826, Bull. zool. Nom., 25(4/5): 139.

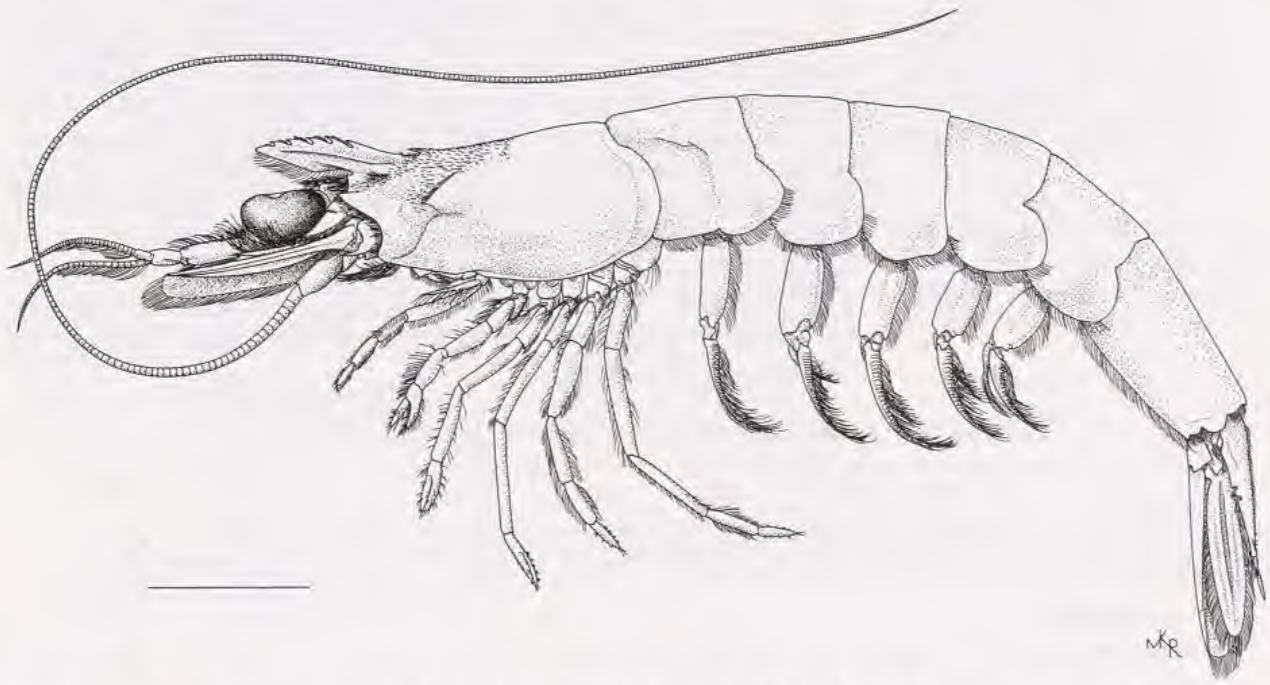

FIG. 90. — *Trachypenaeopsis mobilispinis*, ♀ 11.5 mm cl, Saba Bank, Lesser Antilles. Lateral view. Scale = 5 mm.

Source : MNHN, Paris

TYPE SPECIES: By original designation, *Metapenaeus mobilispinis* Rathbun, 1915, Proc. biol. Soc. Wash., 28: 117.

TYPE LOCALITY: Cave Round Bay, Saba, Netherlands Antilles, 7 m.

GENDER: Feminine.

DIAGNOSIS. — Integument pubescent on anterior part of carapace. Rostrum deep, short, falling distinctly short of distal margin of first antennular segment; armed with dorsal teeth only; epigastric tooth well separated from rostral series. Carapace with small orbital, buttressed antennal, and hepatic spines, lacking pterygostomian spine (pterygostomian margin rounded); postocular sulcus deep; gastro-orbital carina lacking; orbito-antennal sulcus well defined; cervical and hepatic sulci well marked, latter usually curving anteroventrally, accompanied by sharp carina; branchiocardiac carina absent; longitudinal and transverse sutures lacking. Sixth abdominal somite without cicatrix. Telson armed with three pairs of lateral spines, either all movable and subapical pair projecting from strongly produced shoulders, or anterior pairs movable and subapical pair fixed.

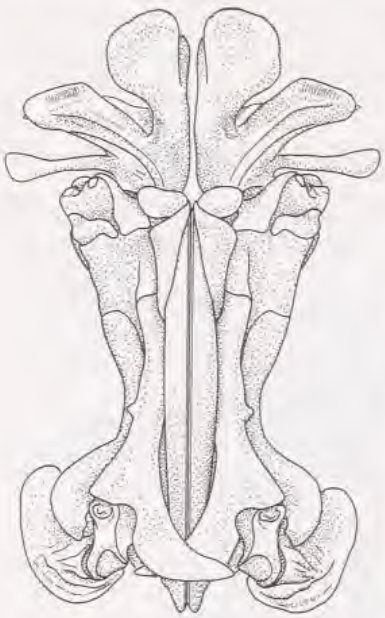

FIG. 91. — *Trachypenaeopsis mobilispinis*, ♂ 8.9 mm cl, Saba Bank, Lesser Antilles. Petasma, dorsal view. Scale = 1 mm.

Antennule lacking parapenaeid spine; antennular flagella short, unequal in length, dorsal ramus shorter than ventral, latter about half to three-fifths as long as carapace. Palp of first maxilla biarticulate, basal article relatively broad, narrowing to minute distal article, with row of proximolateral setae, broadly rounded or subtriangular, setose proximomesial lobule followed by long spine. Basial spine and minute ischial spine on first pereopod only. All epipods non-furcate (unique in family, as far as known).

Petasma symmetrical, semiclosed, with ventrolateral lobule produced into three flat distal processes, one terminal, remainder lateral; dorsolateral lobule forming minute spout; exopod of first pleopod in adult males uniquely bearing laterally two elongate rigid projections, these contiguous along sinuous margins. Appendix masculina roughly ovoid, projecting from thickened dorsomedial margin of endopod. Thelycum closed, with paired narrow lateral plates of sternite XIV, anteriorly flanking base of median protuberance of sternite XIII; protuberance strong, with broad base; posterior thoracic ridge bearing small, pointed, median prominence. Seminal receptacles consisting of paired membranous subspherical sacs opening by oblique slit on each side of median protuberance immediately anterodorsal to anterior margin of lateral plates, sacs uniquely attached posteriorly by narrow septum.

Distribution of branchiae, epipods, and exopods in the genus *Trachypenaeopsis*.

Somite	VII (Mxp1)	VIII (Mxp2)	IX (Mxp3)	X (P1)	XI (P2)	XII (P3)	XIII (P4)	XIV (P5)
Pleurobranchiae	-	-	1	1	1	1	-	-
Arthrobranchiae	r	1	2	2	2	2	1+r	-
Podobranchiae	-	1	-	-	-	-	-	-
Epipods	1	1	-	1	1	1	-	-
Exopods	1	1	1	1	1	1	1	1

Source : MNHN, Paris

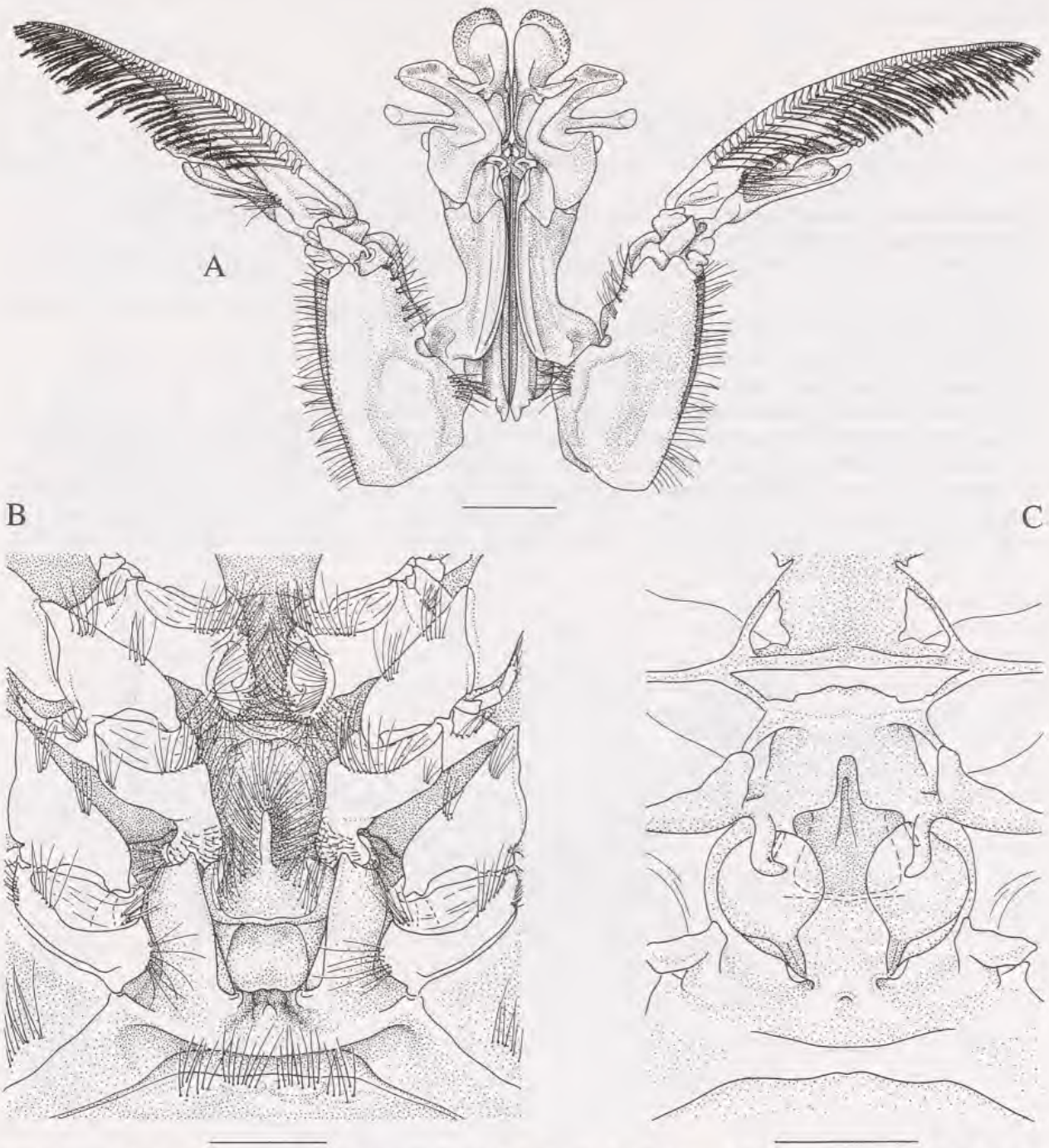

FIG. 92. — *Trachypenaeopsis mobilispinis*: **A**, ♂ 8.9 mm cl, Saba Bank, Lesser Antilles. Petasma and first pleopods, ventral view. — **B-C**: ♀ 11.5 mm cl, Saba Bank, Lesser Antilles. **B**, Thelycum. **C**, Seminal receptacles, dorsal view. Scales = 1 mm.

SPECIES. — *Trachypenaeopsis minicoyensis* Thomas, 1972. Laccadive Sea.

Trachypenaeopsis mobilispinis (Rathbun, 1915). Bermuda; Gulf of Campeche; Turks and Caicos Islands; Cuba; Jamaica; Saba, Netherlands West Indies; Brazil.

Source : MNHN, Paris

Trachypenaeopsis richtersii (Miers, 1884). St. Helena Island; Madagascar; Mauritius; Seychelles; Indonesia; Japan; Hawaii.

Genus ***Trachypenaeus*** Alcock, 1901

Figures 93-95

Penaeus - BATE, 1881, Ann. Mag. nat. Hist., (5)8: 173 [part, description of *Penaeus anchoralis* only].
Peneus (Trachypeneus) Alcock, 1901, Descr. Cat. Indian Deep-Sea Crust., : 15 [part].
Trachypeneus - ALCOCK, 1905, Ann. Mag. nat. Hist., (7)16: 522 [part]. — BURKENROAD, 1983, Crust. Issues, 1: 283 [part].
Trachypeneus (Trachypeneus) - BURKENROAD, 1934a [September], Bull. Bingham oceanogr. Coll., 4(7): 49 [Division II, (part)].
Trachypeneus - BURKENROAD, 1934b [December], Bull. Am. Mus. nat. Hist., 68(2): 94 [Division 2 (part)].
Trachypenaeus [emendment of *Trachypeneus* Alcock, 1901, under the plenary powers by the International Commission on Zoological Nomenclature, 1969, Opinion 864, Bull. zool. Nom., 25(4/5): 139].
Placed on the Official List of Generic Names in Zoology, International Commission on Zoological Nomenclature, 1969, Opinion 864, Name No. 1827, Bull. zool. Nom., 25(4/5): 139. — KUBO, 1949, J. Tokyo Coll. Fish., 36(10: 391 [part]. — DALL, 1957, Austr. J. mar. Freshwat. Res., 8(2): 202 [part]. — RACEK and DALL, 1965, Verh. K. Akad. Wet., 56(3): 87 [part]. — MOTOH and BURI, 1984, Res. Crust., (13-14): 80 [part]. — LIU and ZHONG, 1988, Penaeoid Shr. S. Ch. Sea, : 184 [part]. — DALL *et al.*, 1990, Adv. Mar. Biol., 27: 102 [part].

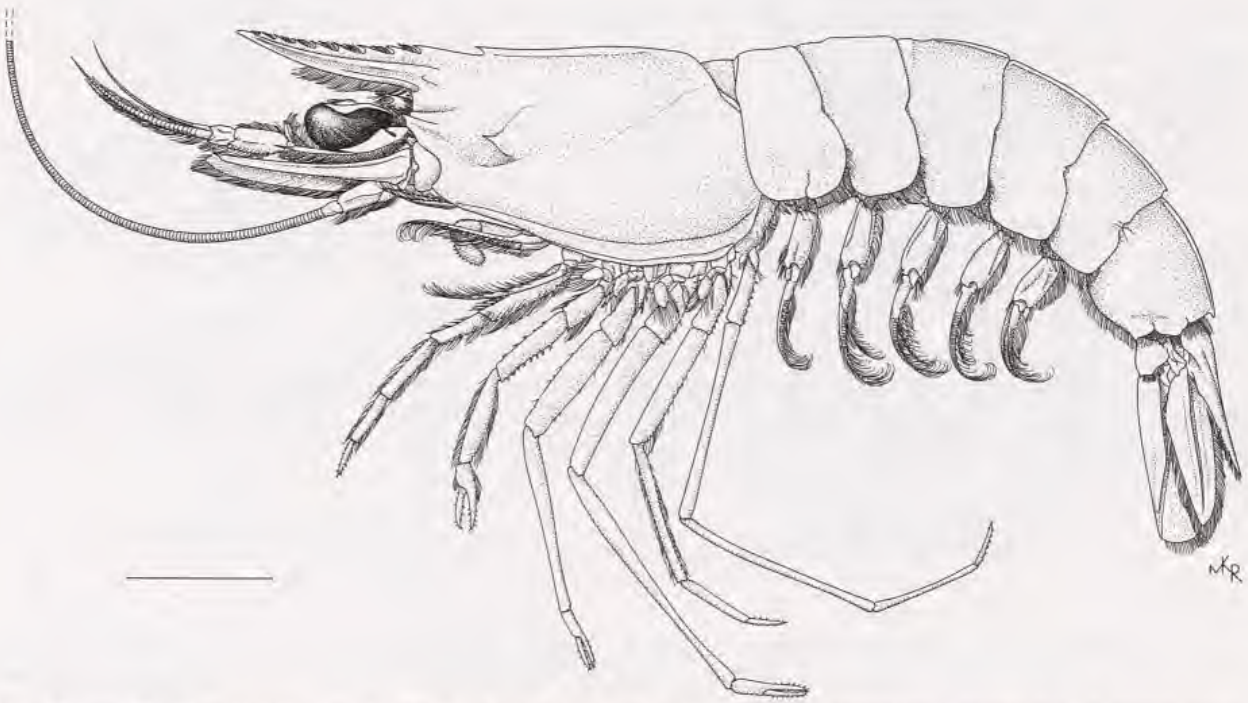

FIG. 93. — *Trachypenaeus anchoralis*, ♀ 23 mm cl, off Northern Territory, Australia. Lateral view. Scale = 10 mm.

TYPE SPECIES: By original designation, *Penaeus anchoralis* Bate, 1881, Ann. Mag. nat. Hist., (5)8: 181.

Source : MNHN, Paris

TYPE LOCALITY: South of New Guinea, [Torres Strait], 9°59'S, 139°42'E, 51 m, Challenger sta. 188.

GENDER: Masculine.

DIAGNOSIS. — Body thickset. Integument thick, densely pubescent. Rostrum relatively short, reaching distal end of second antennular segment; armed with dorsal teeth only; epigastric tooth distinctly separated from first rostral tooth. Carapace with orbital, antennal, and hepatic spines present; pterygostomian angle sharp but lacking spine; postocular sulcus shallow; short faint cervical sulcus, clearly marked hepatic sulcus; orbito-antennal sulcus absent; branchiocardiac carina absent; longitudinal suture weak, short, ending quite anterior to hepatic spine; transverse suture absent. Abdomen with sixth somite lacking cicatrix. Telson with 3 pairs of movable lateral spines, subapical pair projecting from slight shoulder.

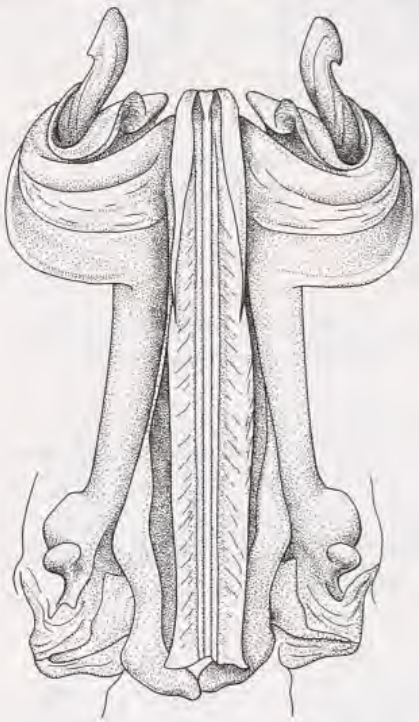

FIG. 94. — *Trachypenaeus anchoralis*, ♂ 13 mm cl, Van Diemen Gulf, Northern Territory, Australia. Petasma, dorsal view. Scale = 1 mm.

Antennule lacking parapenaeid spine; antennular flagella shorter than carapace. Palp of first maxilla entire, tapering to blunt apex, produced into setose proximolateral lobule, rounded setose proximomesial and small acute distomesial lobules, latter bearing sharp spines; also armed distally with ventrolateral row of sharp spinules. Fourth and fifth pereopods with dactyl neither elongate nor subdivided. Basial spine lacking on third maxilliped, present on first and second pereopods; small ischial spine on first pereopod, lacking on second. Epipod present on third pereopod only.

Petasma symmetrical, semiclosed, with lateral lobes produced into very broad distolateral projections, extending laterally, then turning forward and forming long, flat, twisted process directed almost straight forward. Appendix masculina subquadrangular with rounded corners. Thelycum closed, with plate of sternite XIV continuous with median protuberance, lacking anterior sternal invagination, thus neither tranverse groove nor median pocket present; plate markedly depressed anteromedially; median protuberance of sternite XIII comparatively short, not produced caudally. Seminal receptacles consisting of paired bilobed sacs, large posterior lobe and small, depressed, anterolateral one; strongly curved, slitlike openings lying on anteromesial side of large lobe, joining cavity dorsal to posterolateral part of median protuberance, near base of fourth pereopods.

Distribution of branchiae, epipods, and exopods in the genus *Trachypenaeus*.

Somite	VII (Mxp1)	VIII (Mxp2)	IX (Mxp3)	X (P1)	XI (P2)	XII (P3)	XIII (P4)	XIV (P5)
Pleurobranchiae	-	-	1	1	1	1	-	-
Arthrobranchiae	r	2	2	2	2	2	1	-
Podobranchiae	-	1	-	-	-	-	-	-
Epipods	1	1	-	-	-	1	-	-
Exopods	1	1	1	1	1	1	1	v

Source : MNHN, Paris

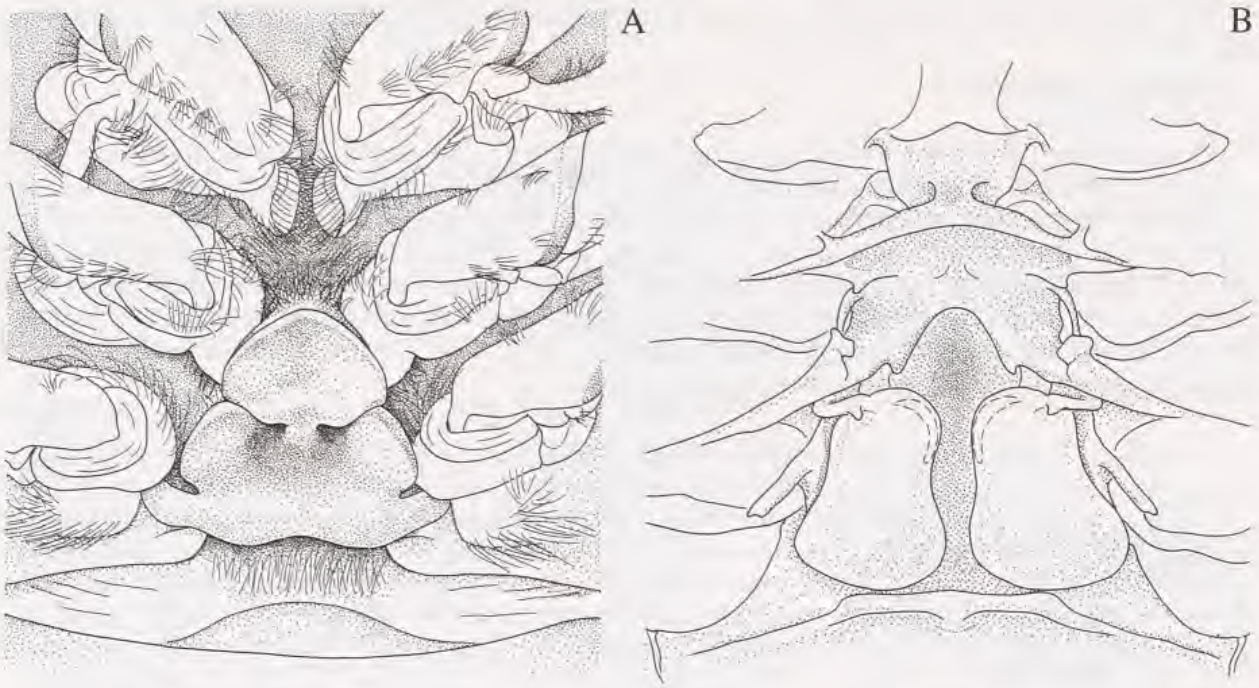

FIG. 95. — *Trachypenaeus anchoralis*: **A**, ♀ 24 mm cl, Van Dienem Gulf, Northern Territory, Australia. Thelycum. — **B**, ♀ 23 mm cl, off Northern Territory, Australia. Seminal receptacles, dorsal view. Scales = 1 mm.

REMARKS. — The characters that differentiate *Trachypenaeus* from *Megokris* are discussed under "Remarks" in the treatment of the latter genus.

SPECIES. — *Trachypenaeus anchoralis* (Bate, 1881). Taiwan; Torres Straits; Western Australia, Northern Territory, Queensland, New South Wales, Australia.

Genus ***Trachysalambria*** Burkenroad, 1934

Figures 96-98

Penaeus - STIMPSON, 1860, Proc. Acad. nat. Sci. Philad., 12: 44 [description of *Penaeus curvirostris* only]. — KISHINOUYE, 1900, J. Fish. Bur., Tokyo, 8(1): 6 [part, features of *P. curvirostris* only].

Peneus (Trachypeneus) - ALCOCK, 1901, Descr. Cat. Indian Deep-Sea Crust., : 15 [part].

Trachypeneus - ALCOCK, 1905, Ann. Mag. nat. Hist., (7)26: 522 [part]. — BURKENROAD, 1959, in Mission R. P. Dollfus Egypte, Result. scient., 3(23-24): 285; 1983, Crust. Issues, 1: 281 [part].

Metapenaeus - NOBILI, 1906, Ann. Sci. nat. Zool. Paris, (9)4: 20 [part].

Trachypeneus (Trachysalambria) Burkenroad, 1934a [September], Bull. Bingham oceanogr. Coll., 4(7): 49 [Division I, Section 2].

Trachypeneus - BURKENROAD, 1934b [December], Bull. Am. Mus. nat. Hist., 68(2): 94 [Division I, Section 2].

Trachypenaeus - KUBO, 1949, J. Tokyo Coll. Fish., 36(1): 391 [part]. — DALL, 1957, Aust. J. mar. Freshwat. Res., 8(2): 202 [part]. — MOTOH and BURI, 1984, Res. Crust., (13-14): 80. — LIU and ZHONG, 1988, Penaeoid Shr. S. Ch. Sea, : 184 [part]. — DALL *et al.*, 1990, Adv. Mar. Biol., 27: 102 [part]. — HAYASHI, 1992, Dendr. Crust. Japan Waters, : 137.

Source : MNHN, Paris

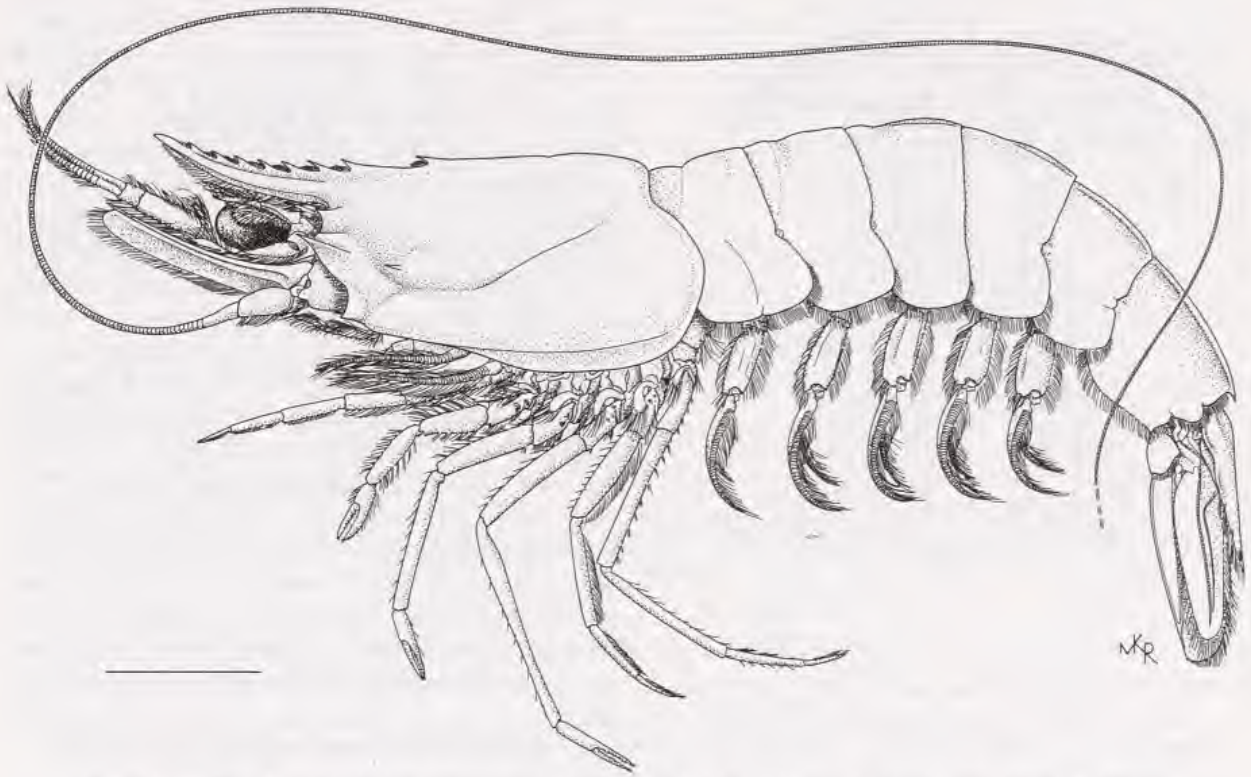

FIG. 96. — *Trachysalambria curvirostris*, ♀ 24 mm cl, Mogi, Japan. Lateral view. Scale = 10 mm.

TYPE SPECIES: By original designation, *Trachypenaeus (Trachysalambria) curvirostris* (Stimpson)[= *Penaeus curvirostris* Stimpson], 1860, Proc. Acad. nat. Sci. Philad., [12]: 44.

TYPE LOCALITY: Port "Simoda" [Shimoda Ko], Japan.

GENDER: Feminine.

DIAGNOSIS. — Body thickset. Integument thick, densely pubescent, pubescence occasionally in large patches. Rostrum relatively short, reaching approximately between base of second antennular segment and distal margin of third; armed with dorsal teeth only; epigastric tooth distinctly separated from first rostral tooth. Carapace with orbital, antennal, and hepatic spines present; pterygostomian angle usually blunt, or rather sharp, always lacking spine; postocular sulcus absent; orbito-antennal sulcus shallow; weak, short, moderately long, or absent cervical sulcus, marked or indistinct hepatic sulcus; branchiocardiac carina extremely weak or lacking; longitudinal suture short, faint, sometimes almost indistinct, ending anterior to hepatic spine; transverse suture short, well marked or, usually, weak, sometimes extremely so. Abdomen with sixth somite lacking cicatrix. Telson with 1-4, usually 3, pairs of movable lateral spines, subapical pair projecting from slight shoulder.

Antennule lacking parapenaeid spine; antennular flagella shorter than carapace. Palp of first maxilla entire, tapering to blunt apex, produced into setose proximolateral, rounded setose proximomesial and small acute distomesial lobules, latter bearing sharp spines; also armed distally with ventrolateral row of spinules. Fourth and fifth pereopods with dactyl neither elongate nor subdivided. Basial spine lacking on third maxilliped, present on first pereopod and usually on second; small ischial spine present or absent on first pereopod. Epipod present on first through third pereopods, on second and third, or on third only.

Source : MNHN, Paris

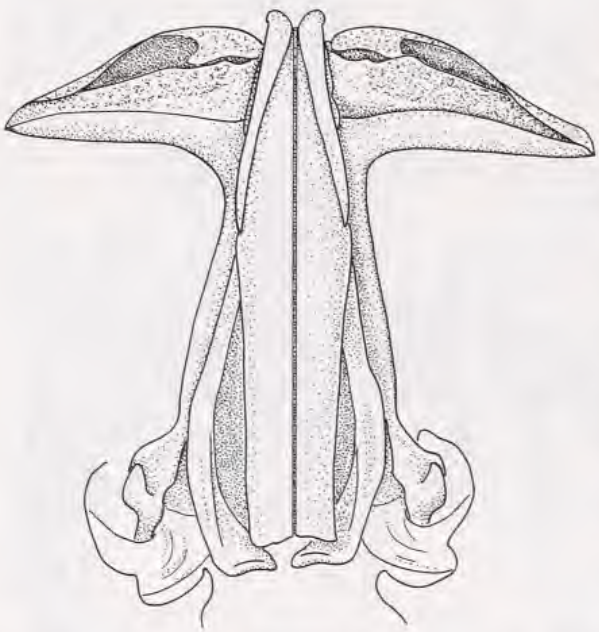

FIG. 97. — *Trachysalambria curvirostris*, ♂ 21 mm cl, Hong Kong. Petasma, dorsal view. Scale = 1 mm.

Petasma symmetrical, semiclosed, with lateral lobes produced distally into usually large, hornlike or winglike projections, extending either horizontally or curving distinctly backwards; if lobes small, subovate and horizontal. Appendix masculina subglobular, or subquadrate with rounded corners. Thelycum closed, with plate of sternite XIV usually moderately long medially (except in *T. brevisuturae*), its anterior margin shallowly emarginate or produced in small median prominence (in *T. brevisuturae* only); anterior sternal invagination forming bracket-shaped groove extending anterolaterally dorsal to plate, not extending posteriorly into median pocket; median protuberance on sternite XIII very strong, but not produced caudally. Seminal receptacles consisting of paired bilobed sacs, each with large posterior lobe and small anterolateral one; their curved slitlike openings on anteromesial side of large lobe continuing into anterolateral part of bracket-shaped groove, lying dorsal to posterolateral part of median protuberance, near base of fourth pereopods.

Distribution of branchiae, epipods, and exopods in the genus *Trachysalambria*.

Somite	VII (Mxp1)	VIII (Mxp2)	IX (Mxp3)	X (P1)	XI (P2)	XII (P3)	XIII (P4)	XIV (P5)
Pleurobranchiae	-	-	1	1	1	1	-	-
Arthrobranchiae	r	2	2	2	2	2	1+r*	-
Podobranchiae	-	1	-	-	-	-	-	-
Epipods	1	1	-	1 (-)	1 (-)	1	-	-
Exopods	1	1	1	1	1	1	1	1

*A rudimentary anteroventral arthrobranchia is found only in *T. brevisuturae*.

REMARKS. — The members of *Trachysalambria* are rather closely allied to those of *Rimapenaeus*; however, they differ in that in the former the plate of sternite XIV is neither deeply cleft anteriorly, at most slightly emarginate, nor produced into paired flaps; anterior sternal invagination of XIV forming a typical bracket-shaped transverse groove and not a well defined median pocket; and the distolateral projections of the petasma extend almost straight laterally or with their tips curving slightly backwards. Also, in *Trachysalambria*, unlike that of *Rimapenaeus*, the longitudinal suture of the carapace is short, not reaching the level of the epigastric tooth; the basial spine is lacking on the third maxilliped, and the seminal receptacles are bilobed, with their openings continuing into the common groove.

It should be pointed out that the validity of two of the species cited below, *T. albicoma* and *T. malaiana*, has been questioned and needs to be confirmed.

Source : MNHN, Paris

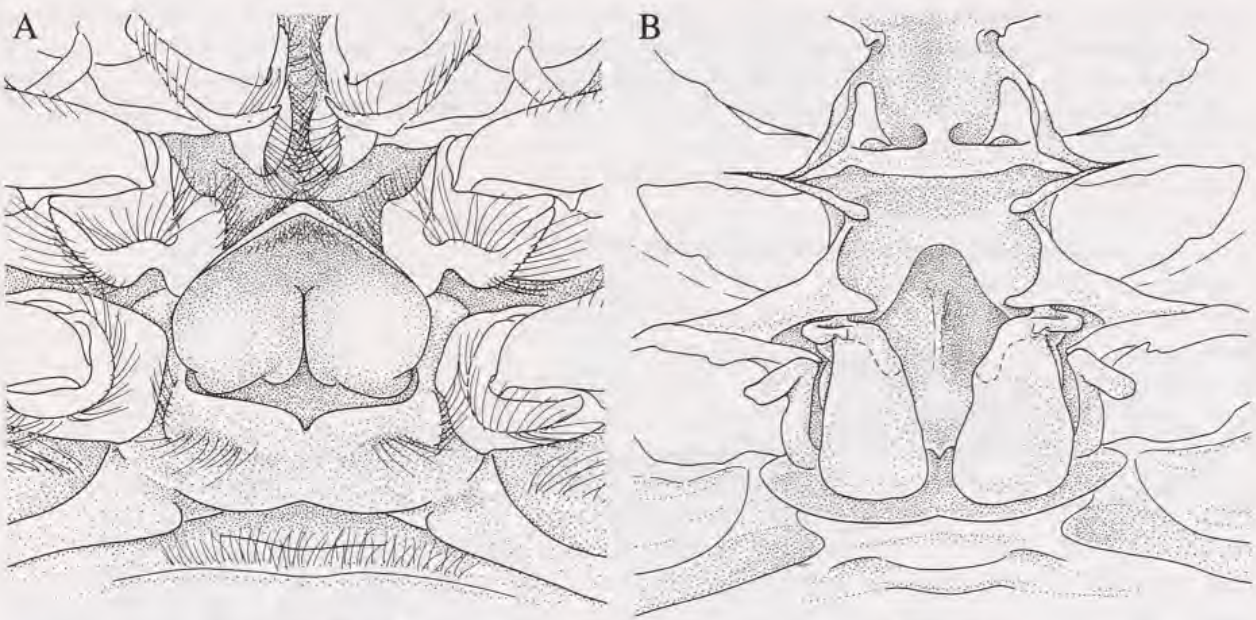

FIG. 98. — *Trachysalambria curvirostris*, ♀ 25 mm cl, off Natal South Africa: **A**, Thelycum. **B**, Seminal receptacles, dorsal view. Scales = 1 mm.

SPECIES. — *Trachysalambria albicoma* (Hayashi and Toriyama, 1980). Japan.

Trachysalambria aspera (Alcock, 1906). India; Andaman Islands; Indonesia; Philippines.

Trachysalambria brevisuturae (Burkenroad, 1934a). Eastern Pacific Ocean from Bahía Almejas, southwest of Baja California, Gulf of California, Sinaloa, Gulf of Tehuantepec, Mexico; El Salvador; northern Peru.

Trachysalambria curvirostris (Stimpson, 1860). Eastern Mediterranean; Natal, South Africa to Tanzania; Red Sea; Madagascar; Yemen to South India including Persian Gulf; Sri Lanka; Malaysia; Indonesia; Gulf of Tonkin; China; Hong Kong; Taiwan; Philippines; Japan; Korea; New Guinea; Western Australia, Northern Territory, New South Wales, Australia.

Trachysalambria fulva (Dall, 1957). Malaysia; Indonesia; Philippines; New Guinea; Western Australia, Queensland, Australia.

Trachysalambria longipes (Paulson, 1875). Red Sea; Gulf of Tonkin; South China Sea; Japan.

Trachysalambria malaiana (Balss, 1933). Borneo; Gulf of Tonkin; South China Sea; Philippines; New Guinea.

Trachysalambria villaluzi (Muthu and Motoh, 1979b). Philippines.

Genus ***Xiphopenaeus*** Smith, 1869

Figures 99-101

Penaeus - HELLER, 1862b, Sber. Akad. Wiss. Wien, 45(1): 425.

Xiphopeneus Smith, 1869, Trans. Conn. Acad. Arts Sci., 2(1): 27; 1885b, Proc. U. S. natn. Mus., 8(11/12): 188. — RATHBUN, 1901, Bull. U. S. Fish Commn., 20(2): 102. — BURKENROAD, 1934b, Bull. Am. Mus. nat. Hist., 63(2): 102; 1983, Crust. Issues, 1: 283. — DALL *et al.*, 1990, Adv. Mar. Biol., 27: 106.

Source : MNHN, Paris

Xiphopenaeus [emendment of *Xiphopeneus* Smith, 1869, under the plenary powers by the International Commission on Zoological Nomenclature, 1969, Opinion 864, Bull. zool. Nom., 25(4/5): 139].
Placed on the Official List of Generic Names in Zoology, International Commission on Zoological Nomenclature, 1969, Opinion 864, Name No. 1828, Bull. zool. Nom., 25(4/5): 139. — HOLTHUIS, 1948, Proc. K. ned. Akad. Wet., 51(9): 1105.

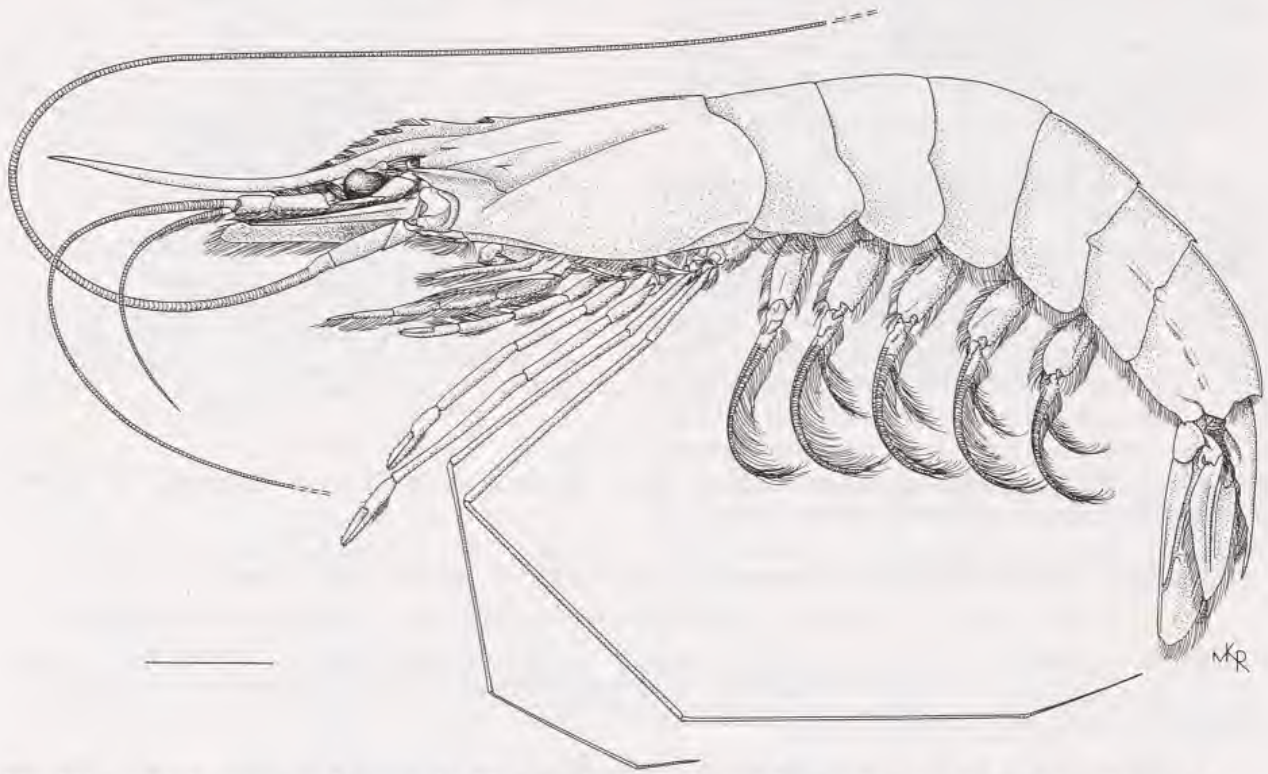

FIG. 99. — *Xiphopenaeus kroyeri*, ♀ 27 mm cl, northwest of Puerto Limón, Costa Rica. Lateral view. Scale = 10 mm.

TYPE SPECIES: By monotypy, *Xiphopeneus hartii* Smith, 1869, Trans. Conn. Acad. Arts Sci., 2(1): 27 [= *Xiphopenaeus kroyeri* (Heller, 1862b)].

TYPE LOCALITY: Caravelas, Estado da Bahia, Brazil.

GENDER: Masculine.

DIAGNOSIS. — Integument glabrous. Rostrum long, considerably overreaching antennular peduncle, usually longer than carapace in adults, sinuous, styliform anteriorly; armed with dorsal teeth only, situated basally; epigastric tooth distinctly separated from first rostral. Carapace with orbital angle well marked, antennal, and hepatic spines present; pterygostomian angle produced but lacking spine; postocular sulcus well marked; clearly distinct orbito-antennal sulcus; short, almost indistinct cervical sulcus, clearly distinct orbito-antennal sulcus; hepatic sulcus and sharp hepatic carina reaching only base of pterygostomian region and posteriorly merging with long branchiocardiac sulcus and carina, respectively; longitudinal suture extending to about midlength of carapace, transverse suture lacking (in adults). Abdomen with sixth somite bearing interrupted cicatrix. Telson unarmed.

Antennule lacking parapenaeid spine; antennular flagella long, dorsal (twice or more as long as carapace) longer than ventral. Palp of first maxilla entire, gradually tapering distally, produced

Source : MNHN, Paris

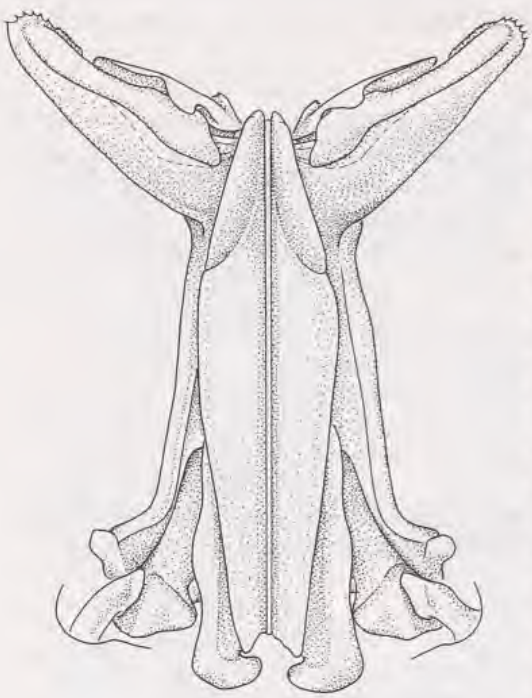

FIG. 100. — *Xiphopenaeus kroyeri*, ♂ 23 mm cl, Punta Araguapiche, Venezuela. Petasma, dorsal view. Scale = 1 mm.

into small, triangular, setose proximolateral lobule, broad, setose proximomesial and quite small, acute setose distomesial lobules, latter armed with slender spine; distolateral row of small spines present on ventral surface. Fourth and fifth pereopods long, much longer than third, subflagelliform, each with multiarticulate dactyl. Basial and ischial spines on first pereopod only.

Petasma semiclosed, symmetrical, with lateral lobes produced into large, hornlike, distolateral projections. Appendix masculina subcircular. Male genital openings subcoxal. In females, first pleopod lacking rudimentary endopod. Thelycum closed, with single plate of sternite XIV smooth, broad, not produced anteriorly into pair of flaps, its anterolateral hoods much reduced; anterior sternal invagination nearly as broad as sternite, forming spacious pocket extending as far as posterior thoracic ridge; median protuberance of sternite XIII also broad but quite short. Paired seminal receptacles bilobed, each consisting of large posterior lobe and small anterolateral one; sinuous slitlike opening lying on anterior extremity of posterior lobe, connecting with median pocket and extending laterally dorsal to posterolateral extremity of median protuberance.

BURKENROAD's observations (1934b) indicate that the spermatophore (sperm packets and plug substance) of *X. kroyeri* is similar to that reported for *Rimapenaeus (= Trachypenaeus) similis* by BAUER (1991).

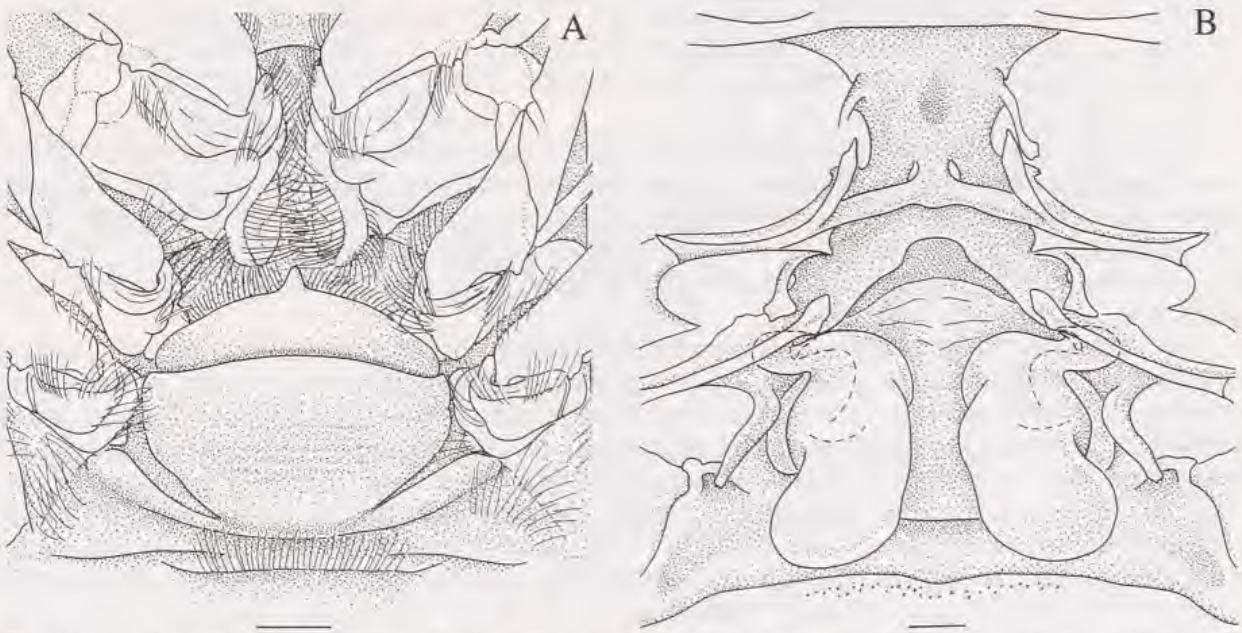

FIG. 101. — *Xiphopenaeus kroyeri*, ♀ 27 mm cl, Northwest of Puerto Limón, Costa Rica: **A**, Thelycum. **B**, Seminal receptacles, dorsal view. Scales = 1 mm.

Source : MNHN, Paris

The study of extensive material of specimens of this genus demonstrated that there are no differences between those from the Atlantic and Pacific, that would justify their separation into two species.

Distribution of branchiae, epipods, and exopods in the genus *Xiphopenaeus*.

Somite	VII (Mxp1)	VIII (Mxp2)	IX (Mxp3)	X (P1)	XI (P2)	XII (P3)	XIII (P4)	XIV (P5)
Pleurobranchiae	-	-	1	1	1	1	-	-
Arthrobranchiae	r	2	2	2	2	2	1	-
Podobranchiae	-	1	-	-	-	-	-	-
Epipods	1	1	-	1	1	1	-	-
Exopods	1	1	1	1	1	1	1	1

SPECIES. — *Xiphopenaeus kroyeri* (Heller, 1862a). Punta Piaxtla, Sinaloa, Mexico to Paita, Peru; North Carolina to Gulf of Mexico, Caribbean Sea to Santa Catarina, Brazil.

Family SICYONIIDAE Ortmann, 1898

Sicyoninae Ortmann, 1898, Bronn's Kl. Ordn. Tierreichs, (1st ed.) (5)2: 1121. — BALSS, 1957, Bronn's Kl. Ordn. Tierreichs, (2nd ed.) 5(1)7(12): 1520.
Placed on the Official List of Family-Group Names in Zoology, International Commission on Zoological Nomenclature, 1956b, Direction 54, Op. Decl. Int. Comm. zool. Nom., 12(26): 460.
Penaeidae - BARNARD, 1950, Ann. Mus. Nat. Hist., 38: 580 [part].
Sicyonidae - GREY *et al.*, 1983, Guide Austr. Prawns, : 13, 31. — DALL *et al.*, 1990, Adv. Mar. Biol., 27: 60.
Sicyoniidae - PÉREZ FARFANTE, 1978, FAO Ident. Sh., 6: SICYON. — WILLIAMS, 1984, Shr. Lob. Crabs Atl. Coast U.S., : 42. — PÉREZ FARFANTE, 1988, NOAA Tech. Rep. NMFS, 64: iv, 22.

DIAGNOSIS. — Body thickset. Integument rigid, pubescent. Rostrum armed with dorsal and usually apical teeth, lacking ventral teeth, short, not overreaching antennular peduncle. Carapace without postorbital and pterygostomian spines, bearing or lacking antennal spine; cervical sulcus very weak or absent; hepatic carina weak, branchiocardiac carina strong to barely distinct. Abdomen marked by transverse sulci, often tuberculate. Telson armed with pair of lateral fixed subterminal spines.

Eye with optic calathus articulated directly to basal segment of eyestalk, intermediate segment not apparent, without mesial tubercle; basal segment without ocular scale; ocular plate bearing styliform mesial projection (stylet). Antennule with prosartema rudimentary, flagella short, cylindrical. Third through fifth pleopods uniramous, lacking endopods (unique in Penaeoidea). Exopod on first maxilliped, absent from second and third maxillipeds and all pereopods. Pleurobranchia on somite IX only; rudimentary arthrobranchia on somite VII, two arthrobranchiae on somites VIII through XIII, anteroventral one of XIII rudimentary; podobranchia on second maxilliped; epipods on first and second maxillipeds and first three pereopods. Petasma closed, its lateral lobes heavily sclerotized. Second pleopods in male bearing appendix masculina only. Thelycum closed.

Source : MNHN, Paris

Genus *Sicyonia* H. Milne Edwards, 1830
Figures 102-104

Cancer - BRÜNNICH, 1768, Ichthyol. Massil., : 102 [part].
Palaemon - OLIVIER, 1811, Encycl. méthod. Hist. nat., 8: 664 [part].
Hippolyte - DE HAAN, 1844, Fauna Jap. (Crust.), (6, 7): pl. 45, fig. 6, 9, 10 [part].
Sicyonia H. Milne Edwards, 1830, Annls Sci. nat., (1)19: 339. — BATE, 1888, Rep. scient. Results Voy. Challenger, 24: 292. — HOLTHUIS, 1952b, Bull. zool. Nom., 6: 339. — BURKENROAD, 1983, Crust. Issues, 1: 282. — DE FREITAS, 1984, Invest. Rep. oceanogr. Res. Inst. Durban, 60: 1. — PÉREZ FARFANTE, 1985, Fish. Bull., U. S., 83(1): 1.
Placed on Official List of Generic Names in Zoology, International Commission on Zoological Nomenclature, 1956a, Opinion 382, Name No. 922, Opin. Decl. Internat. Comm. Zool. Nom., 12(3): 45.
Ruvulus De Natale, 1850, Descriz. zool. Plojaria crost. Messina, : 20. (Published as synonym of *Sicyonia* H. Milne Edwards, 1830). Type species: By monotypy: *Sicyonia sculpta* H. Milne Edwards, 1830, Annls. Sci. nat., (1)19: 340 (= *Cancer carinatus* Brünnich, 1768, Ichthyol. Massil., : 102). Type locality: Bay of Naples. Gender: Masculine.
Synhimantites Boeck, 1864, Forh. VidenskSelskr. Christ., (1863): 189. Type species: By monotypy, *Synhimantites typicus* Boeck, 1864, Forh. VidenskSelsk. Christ., (1863): 189. Type locality: Norway. Gender: masculine.
Eusicyonia Stebbing, 1914, Ann. S. Afr. Mus., 15: 25. [Substitute name for *Sicyonia* H. Milne Edwards, 1830, Annls Sci. nat., (1)19: 339]. — BURKENROAD, 1934a, Bull. Bingham oceanogr. Coll., Yale Univ., 4(7): 70; 1934b, Bull. Am. Mus. nat. Hist., 68(2): 116. — KUBO, 1949, J. Tokyo Coll. Fish., 36(1): 437. — BARNARD, 1950, Ann. S. Afr. Mus., 38: 635. Type species: By monotypy for *Sicyonia* H. Milne Edwards, 1830: *Sicyonia sculpta* H. Milne Edwards, 1830, Annls Sci. nat., (1)19: 340. Type locality: Bay of Naples, Mediterranean Sea. Gender: feminine.

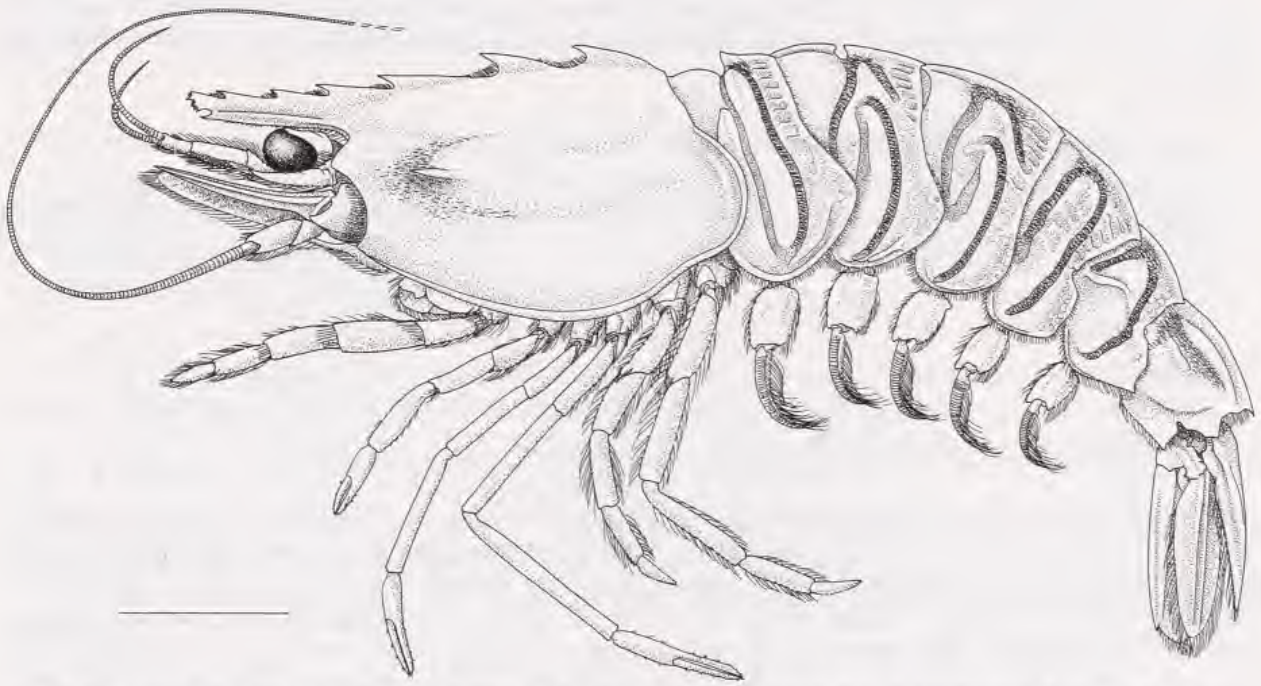

FIG. 102. — *Sicyonia carinata*, ♀ 19.4 mm cl, Gibraltar, Mediterranean Sea. Lateral view. Scale = 10 mm.

Source : MNHN, Paris

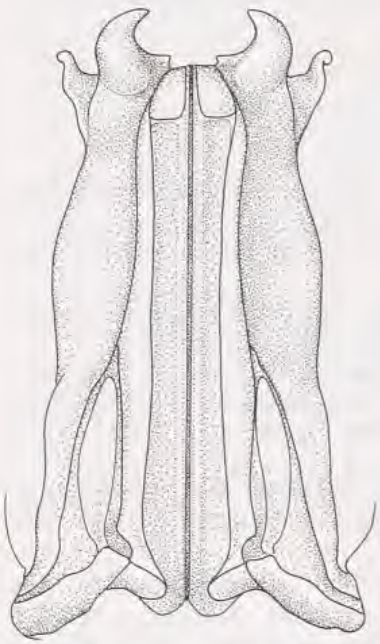

FIG. 103. — *Sicyonia carinata*, ♂ 19.4 mm cl, Gibraltar, Mediterranean Sea. Petasma, dorsal view. Scale = 1 mm.

TYPE SPECIES: By subsequent designation, by DESMAREST, 1858, Encycl. Hist. Nat. (Crust. Moll. Zooph.): 42, *Sicyonia sculpta* H. Milne Edwards, 1830, Annls Sci. nat., (1)19: 340 (= *Cancer carinatus* Brünnich, 1768, Ichthyol. Massil., 1768: 102).

TYPE LOCALITY: Bay of Naples, Mediterranean Sea.

GENDER: Feminine.

DIAGNOSIS. — Body robust, strongly sclerotized, of stony appearance, variably pubescent. Rostrum armed with dorsal and usually apical teeth, lacking ventral teeth, short, not overreaching antennular peduncle, more often falling short of it. Carapace without postorbital and pterygostomian spines, bearing or lacking antennal spine; hepatic spine well developed; cervical sulcus very weak or absent; hepatic carina weak; branchiocardiac carina strong to virtually indistinct. Abdomen marked by transverse sulci bordered by closely set setae, often tuberculate; sixth somite bearing cicatrix. Telson armed with pair of lateral fixed, subterminal spines.

Eye with optic calathus articulated directly to basial article of eyestalk; basal article without scale; ocular plate armed with styletlike projection. Antennule with prosartema rudimentary, flagella short, subcylindrical. Palp of first maxilla entire, broad, blunt to subacute apically, lacking or bearing weak proximolateral lobule and produced mesially into broad proximal lobule and much smaller distal lobule, latter armed with spine; also bearing sublateral row of spinous setae. Both basial and ischial spine present or absent on first pereopod. Third through fifth pleopods lacking endopods.

Distribution of branchiae, epipods, and exopods in the genus *Sicyonia*.

Somite	VII (Mxp1)	VIII (Mxp2)	IX (Mxp3)	X (P1)	XI (P2)	XII (P3)	XIII (P4)	XIV (P5)
Pleurobranchiae	-	-	1	-	-	-	-	-
Arthrobranchiae	r	r+1	2	2	2	2	r+1	-
Podobranchiae	-	1	-	-	-	-	-	-
Epipods	1	1	-	1	1	1	-	-
Exopods	1	-	-	-	-	-	-	-

Petasma closed, lateral lobes heavily sclerotized, depressed, its dorsolateral and ventrolateral lobules each produced into distal projections. Appendix masculina small, roughly bellshaped but with membranous terminal wall. Male genital openings sternal. Thelycum closed, with single plate of sternite XIV flat or raised in paired, weak or prominent, lateral bulges; median plate of sternite XIII roughly lanceolate, long, sometimes conspicuously overreaching sternite XI. Seminal receptacles consisting of paired trilobed membranous sacs: large, longitudinally disposed posterior lobe, and two small anterior lobes, one directed anteromesially, the other laterally; openings lying between lateral hoods of sternite XIV and posterolateral margin of median plate of

Source : MNHN, Paris

sternite XIII. Seminal receptacles of several American species were studied by PÉREZ FARFANTE (1985) and BAUER (1986, 1991).

True spermatophores are not formed; only sperm in a fluid matrix is transferred to female seminal receptacles, without any plug substance (BURKENROAD, 1934b; BAUER, 1991).

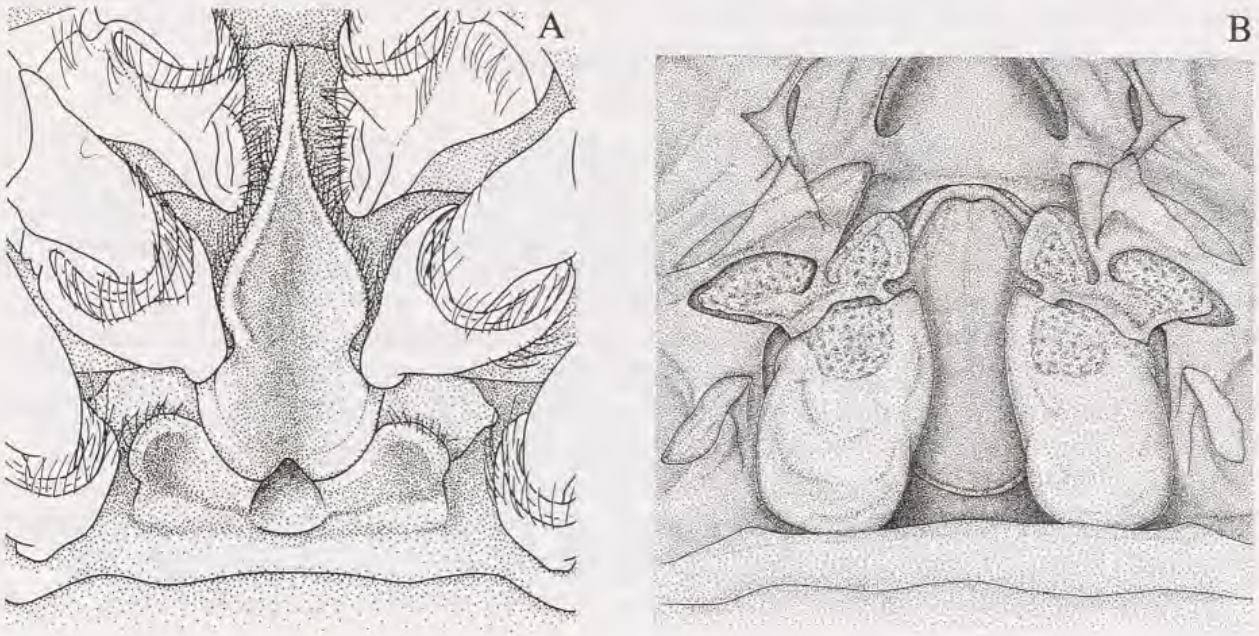

FIG. 104 A. — *Sicyonia carinata*, ♀ 16 mm cl, Gibraltar, Mediterranean Sea. Thelycum. Scale = 1 mm.
FIG. 104 B. — *Sicyonia disedwardsi*, ♀ 30 mm cl, Golfo de Panama, Panama. Seminal receptacles, dorsal view. Scale = 1 mm.

SPECIES. — *Sicyonia affinis* Faxon, 1893. Costa Rica; Panama; Colombia; Northern Peru.

Sicyonia aliaffinis (Burkenroad, 1934a). Eastern Pacific Ocean from southwestern Baja California Sur and Gulf of California to southern Mexico; Guatemala; Costa Rica; Panama; Ecuador; Paita, northern Peru.

Sicyonia benthophila De Man, 1907. Indonesia.

Sicyonia bispinosa (De Haan, 1849). Indonesia; Japan.

Sicyonia brevirostris Stimpson, 1871. Eastern Pacific Ocean off southern Mexico; Western Atlantic Ocean from Virginia to Florida, Gulf of Mexico; Yucatan; Bahamas; Cuba.

Sicyonia burkenroadi Cobb, 1971. North Carolina to Florida through Gulf of Mexico; West Indies; Caribbean coast of Central and South America to Bahia, Brazil.

Sicyonia carinata (Brünnich, 1768). Banyuls, France; Mediterranean; east Atlantic Ocean; Portugal; Mauritania; Guinea; Principe; Sao Tomé; Congo; Angola.

Sicyonia cristata (De Haan, 1844). South China Sea; Hong Kong; Taiwan; Japan; northern Australia.

Sicyonia curvirostris Balss, 1913a. Indonesia; South China Sea; Taiwan; Japan.

Sicyonia disdorsalis (Burkenroad, 1934a). Eastern Pacific, south-western Baja California Sur, Gulf of California, Mexico to Pisco, Peru.

Source : MNHN, Paris

Sicyonia disedwardsi (Burkenroad, 1934a). Eastern Pacific Ocean, southwestern Baja California Sur and Gulf of California, to Colima, Mexico; Costa Rica; Panama.

Sicyonia disparri (Burkenroad, 1934a). Southwestern Baja California Sur and Gulf of California to Nayarit, Mexico.

Sicyonia dorsalis Kingsley, 1878. North Carolina to Gulf of Mexico; Caribbean coast of Central and South America to Central Brazil.

Sicyonia fallax De Man, 1907. Madagascar; Indonesia.

Sicyonia formosa Chan and Yu, 1985. Taiwan.

Sicyonia furcata Miers, 1878. Philippines.

Sicyonia galeata Holthuis, 1952a. Eastern Atlantic Ocean from Western Sahara to Angola.

Sicyonia inflexa (Kubo, 1949). Indonesia; Japan.

Sicyonia ingentis (Burkenroad, 1938). Monterey Bay, California to southern tip of Baja California Sur; Gulf of California to Nayarit, Mexico.

Sicyonia japonica Balss, 1914a. Gulf of Aden; South China Sea; Hong Kong; Taiwan; Japan.

Sicyonia laevigata Stimpson, 1871. Eastern Pacific Ocean; southern Gulf of California; Costa Rica; Panama; western Atlantic Ocean, North Carolina to southern Florida; Gulf of Mexico; West Indies; Caribbean coast of Mexico, Central and South America to Santa Catarina, Brazil.

Sicyonia laevis Bate, 1881. Indonesia; New Guinea; Hawaii.

Sicyonia lancifer (Olivier, 1811). Mozambique; Red Sea; Gulf of Aden; Madagascar; Maldive Islands; Sri Lanka; Malaysia; Indonesia; Gulf of Tonkin; South China Sea; Philippines; Japan.

Sicyonia longicauda Rathbun, 1906. East coast of South Africa; Mozambique; Taiwan; Japan; Hawaii.

Sicyonia martini Pérez Farfante and Boothe, 1981. Eastern Pacific Ocean, southwest Baja California Sur, Gulf of California, southern Mexico to Panama.

Sicyonia mixta Burkenroad, 1946. Southwest Baja California Sur, and southern Gulf of California; Panama; Puerto de Eten, northern Peru.

Sicyonia nasica Burukovsky, 1990. South-east Pacific Ocean near Sala-y-Gómez.

Sicyonia nebulosa (Kubo, 1949). Indonesia; Japan.

Sicyonia ocellata Stimpson, 1860. Sri Lanka; Singapore; Indonesia; Torres Straits; South China Sea.

Sicyonia olgae Pérez Farfante, 1980b. Dry Tortugas, Antilles to Surinam.

Sicyonia ommanneyi Hall, 1956. Singapore; Malaysia; South China Sea.

Sicyonia parafallax Crosnier, 1995. Red Sea.

Sicyonia parri (Burkenroad, 1934a). North Carolina through Gulf of Mexico; West Indies; Colombia to Brazil.

Sicyonia parvula (De Haan, 1850). Indonesia; Japan.

Sicyonia penicillata Lockington, 1879. Baja California; Gulf of California; Costa Rica.

Sicyonia picta Faxon, 1893. Baja California Sur, Gulf of California to Islas Lobos de Afuera, northern Peru.

Sicyonia rectirostris De Man, 1907. Indonesia.

Sicyonia stimpsoni Bouvier, 1905a. North Carolina to Florida through Gulf of Mexico; West Indies; Caribbean coast of Mexico, Central and South America to Surinam.

Sicyonia trispinosa De Man, 1907. Indonesia.

Source : MNHN, Paris

Sicyonia truncata (Kubo, 1949). Indonesia; Japan.

Sicyonia typica (Boeck, 1864). North Carolina through Gulf of Mexico; Antilles; Caribbean coast of Central and South America to Santa Catarina, Brazil.

Sicyonia vitulans (Kubo, 1949). Japan.

Sicyonia wheeleri Gurney, 1943. Bermuda.

Family SOLENOCERIDAE Wood-Mason, 1891

Solenocerina Wood-Mason, 1891, Ann. Mag. nat. Hist., (6)8: 275.

Parapenaeinae - Ortmann, 1898, Bronn's Kl. Ordn. Tierreichs, (5)2: 1119, 1120 [part].

Peneinae - Alcock, 1901, Descr. Cat. Indian Deep-sea Crust., : 13 [part].

Solenocerinae - Burkenroad, 1934b, Bull. Am. Mus. nat. Hist., 68: 63. — Ramadan, 1938, Scient. Rep. John Murray Exped., 5(3): 56. — Crosnier, 1978, Faune Madagascar, 46: 14, 96. — Burkenroad, 1983, Crust. Issues, 1: 281, 285. — Crosnier, 1985, Mar. Res. Indonesia, 24: 31; 1988, Bull. Mus. nat. Hist. Nat., Paris, 4(10)[A](3): 563; 1989, Sencken. Biol., 69: 379.

Placed on the Official List of Family-Group Names in Zoology, International Commission on Zoological Nomenclature, 1961, Opinion 611, Bull. zool. Nom., 18(5): 307.

Penaeidae - Barnard, 1950, Ann. S. Afr. Mus., 38: 580 [part].

Solenoceridae - Pérez Farfante, 1978, FAO Sp. Indent. Sh., 6: 2. — Grey *et al.*, 1983, Guide Austr. Pen. Prawns, : 14. — Williams, 1984, Shr. Lob. Crabs Atl. Coast U.S., 17. — De Freitas, 1985, Investl. Rep. oceanogr. Res. Inst., Durban, 57: 28. — Pérez Farfante, 1988, NOAA Tech. Rep. NMFS, 64: iv, 26. — Dall *et al.*, 1990, Adv. Mar. Biol., 27: 59.

Diagnosis. — Integument thin or firm. Rostrum laterally compressed, relatively short, seldom reaching beyond antennular peduncle, armed with dorsal teeth, usually lacking ventral teeth. Carapace with postorbital or postantennal and hepatic spines, antennal spine almost always present; orbital, branchiostegal, and pterygostomian spines present or absent. Cervical sulcus well defined, reaching or almost reaching dorsal midline. Telson apically acute, usually armed with subapical pair of fixed spines, occasionally with movable lateral spines, rarely lacking spines.

Eye with optic calathus bearing small mesial tubercle; basal segment of eyestalk produced into strongly to barely developed ocular scale; ocular plate lacking styliform projection. Antennule with prosartema variable in length, usually long and foliaceous, sometimes reduced to short rigid projection; flagella usually very long, slender, subcylindrical or flattened. Exopods on all maxillipeds and pereopods. Third through fifth pleopods biramous. Pleurobranchia on somites IX through XIV; one or two rudimentary or small arthrobranchia on VII, two well developed arthrobranchiae on VIII through XIII; podobranchia on second maxilliped, rarely on following appendages, never on fourth and fifth pereopods.

Petasma open or semi-open. Second pleopod of male bearing appendix masculina, appendix interna, and with basis produced into distolateral, ventrally inclined projection or spur. Thelycum open.

Key to the Genera of the Family SOLENOCERIDAE

1. Movable lateral telsonic spines present **2**
— Movable lateral telsonic spines absent **3**

2. Post-cervical spine present, situated dorsal to hepatic spine .. ***Gordonella***
— Post-cervical spine lacking ..... ***Haliporus***

Source : MNHN, Paris

3. Orbital spine present **4**
— Orbital spine absent **6**

4. Both antennular flagella flattened ..... ***Solenocera***
— Both antennular flagella subcylindrical or ventral flagellum flattened **5**

5. Both antennular flagella subcylindrical ..... ***Pleoticus***
— Ventral antennular flagellum flattened ..... ***Mesopenaeus***

6. Suprahepatic spine present ..... ***Haliporoides***
— Suprahepatic spine absent **7**

7. Neither fourth nor fifth pereopods flagelliform ..... ***Cryptopenaeus***
— Fifth or fourth and fifth pereopods flagelliform **8**

8. Fifth pereopod flagelliform, considerably longer than fourth .....
.....***Hadropenaeus***
— Fourth and fifth pereopods flagelliform ..... ***Hymenopenaeus***

Genus ***Cryptopenaeus*** De Freitas, 1979

Figures 105-106

Cryptopenaeus De Freitas, 1979, Ann. S. Afr. Mus., 77: 123; 1985, Invest. Rep. oceanogr. Res. Inst. Durban, 57: 50.

Crassipenaeus Liu and Zhong, 1983, Chin. J. Oceanol. Limnol., 1: 171. Type species: By original designation, *Crassipenaeus sinensis* Liu and Zhong, 1983, Chin. J. Oceanol. Limnol., 1(2): 171. Type locality: Northeastern Guangdong near Shantou (Swatow), 261 m. Gender: Masculine.

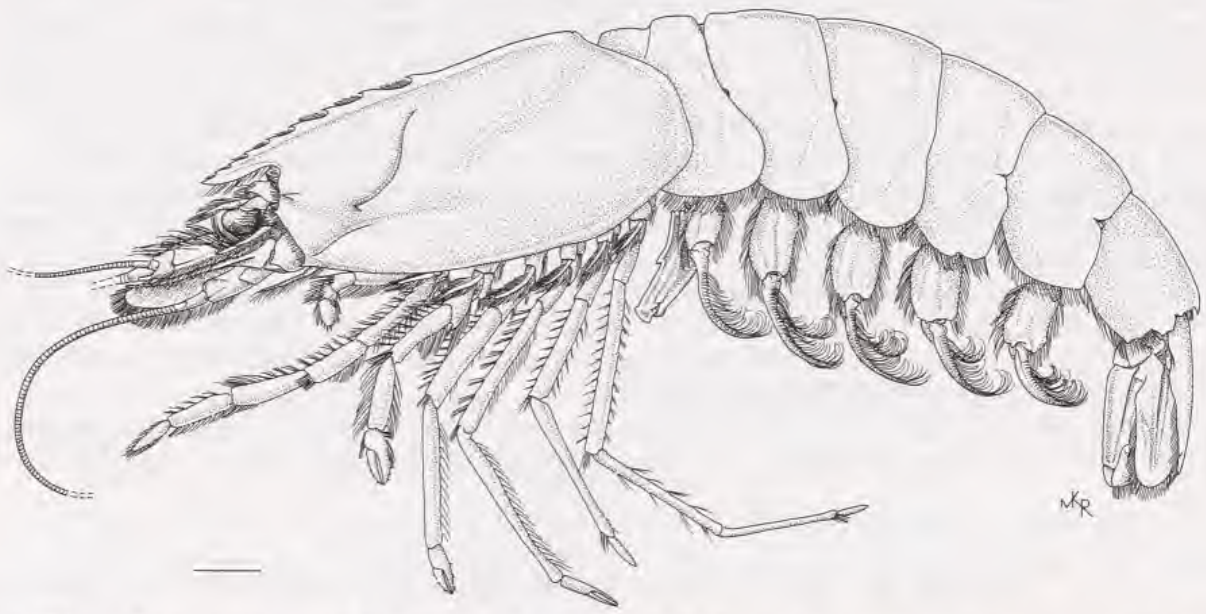

FIG. 105. — *Cryptopenaeus catherinae*, ♂ 47.5 mm cl, off Cabo Santa Maria, Mozambique. Lateral view. Scale = 1 mm.

TYPE SPECIES: By original designation, *Cryptopenaeus catherinae* De Freitas, 1979, Ann. S. Afr. Mus., 77: 125, fig. 1 A-I.

Source : MNHN, Paris

TYPE LOCALITY: Off Cape Santa Maria, southern Mozambique, 26°06'S, 33°08'E, 350 m.
GENDER: Masculine.

DIAGNOSIS. — Body robust, firm. Integument glabrous or minutely setose punctate. Rostrum short, not overreaching distal end of second antennular peduncle, armed with dorsal teeth only. Carapace with small antennal spine and well developed postorbital, hepatic, and pterygostomian spines; lacking orbital, suprahepatic, and branchiostegal spines; cervical carina and sulcus well marked; branchiocardiac carina distinct to almost indistinguishable; submarginal carina present. Telson armed with pair of short, fixed, subapical spines, movable marginal spines lacking.

Antennular flagella similar, subcircular in cross section, as long as or slightly longer than carapace. Mandibular palp biarticulate, articles subequal in length, distal one narrower than proximal and tapering to rounded apex. Palp of first maxilla entire, short, gently tapering to blunt apex, and bearing weak but densely setose, proximolateral lobule, and proximomesial and distomesial lobules, latter with long spines. Basial spine on first and second pereopods, ischial spine on first only. Lateral ramus of uropod bearing small or barely distinct distolateral spine.

Petasma semi-open, symmetrical, with short dorsomedian lobule; ventromedian lobules heavily sclerotized distally there ending in conspicuous process, and ventrolateral lobules virtually occupied by ventral costae. Appendix masculina roughly trapezoidal; appendix interna present; basis of pleopod produced distally into ventrolateral spur. Thelycum open, with protuberances (2-3) or plates on anterior part of sternite XIV.

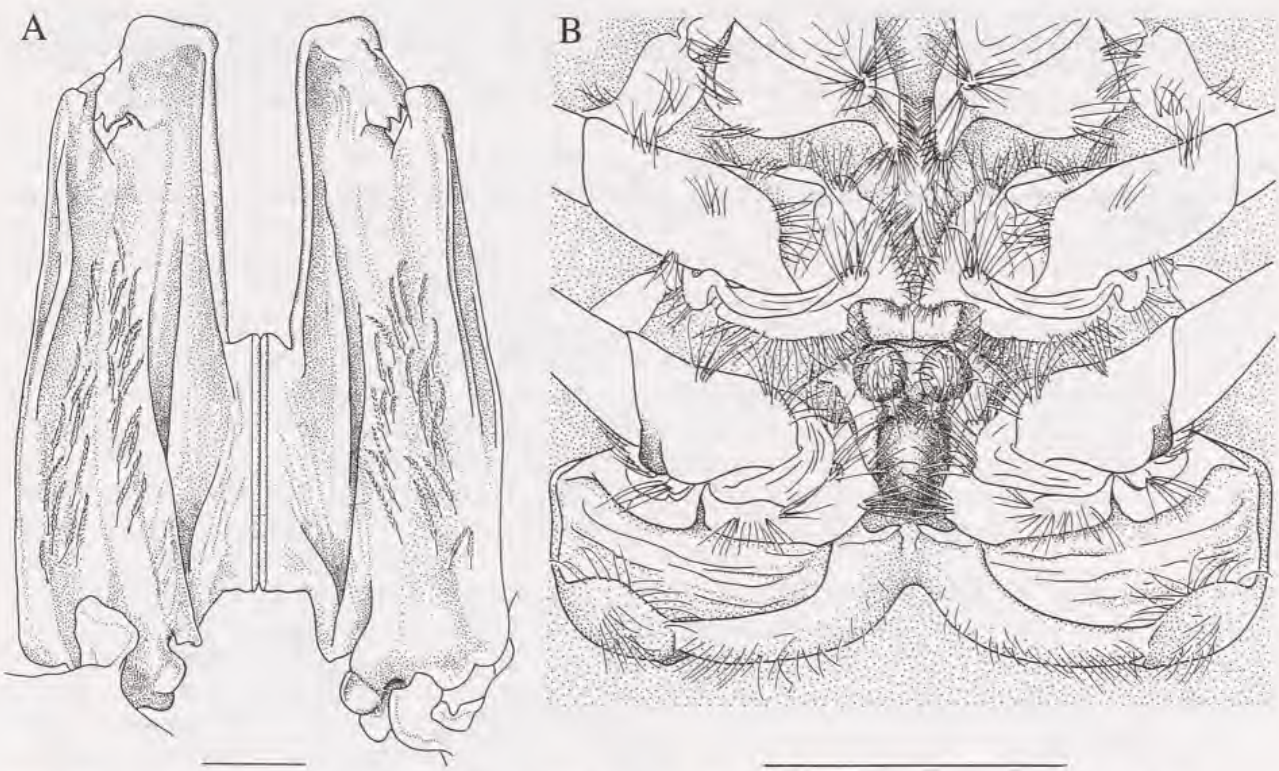

FIG. 106. — *Cryptopenaeus catherinae*, ♂ 47.5 mm cl, off Cabo Santa Maria, Mozambique: **A**, Petasma, ventral view. Scale = 1 mm. — **B**, ♀ 63.2 mm cl, off Monte Bello, Mozambique. Thelycum. Scale = 10 mm.

Source : MNHN, Paris

Distribution of branchiae, epipods, and exopods in the genus *Cryptopenaeus*.

Somite	VII (Mxp1)	VIII (Mxp2)	IX (Mxp3)	X (P1)	XI (P2)	XII (P3)	XIII (P4)	XIV (P5)
Pleurobranchiae	-	-	1	1	1	1	1	1
Arthrobranchiae	r	2	2	2	2	2	2	-
Podobranchiae	-	1	-	-	-	-	-	-
Epipods	1	1	1	1	1	1	1	-
Exopods	1	1	1	1	1	1	1	1

SPECIES. — *Cryptopenaeus catherinae* de Freitas, 1979. Natal, South Africa; southern Mozambique; Kenya.

Cryptopenaeus clevai Crosnier, 1985. Indonesia; Wallis and Futuna Islands.

Cryptopenaeus crosnieri Pérez Farfante and Kensley, 1985. New South Wales, Australia.

Cryptopenaeus sinensis (Liu and Zhong, 1983). Off Western Australia; South China Sea.

Genus ***Gordonella*** Tirmizi, 1960

Figures 107-109

Haliporus - ALCOCK and ANDERSON, 1894, J. Asiat. Soc. Beng., 63(2)3: 146 [part]. — ALCOCK, 1901, Descr. Cat. Indian Deep-Sea Crust., : 22 [part]. — BOUVIER, 1906b, Bull. Mus. océanogr. Monaco, 81: 1 [part]; 1908a, Résult. Camp. scient. Prince Albert I, 33: 78 [part]. — KENSLEY, 1968, Ann. S. Afr. Mus., 50(12): 299. — PÉREZ FARFANTE, 1977a, Fish. Bull., U. S., 75(2): 263 [part]. — CROSNIER, 1978, Faune Madagascar, 46: 97 [part].

Gordonella Tirmizi, 1960, Scient. Rep. John Murray Exped. 1933-34, 10(7): 372. — GORDON, 1960 (in TIRMIZI, 1960), Scient. Rep John Murray Exped 1933-34, 10(7): 379. — CROSNIER, 1988, Bull. Mus. Hist. nat. Paris, (4)10: 586.

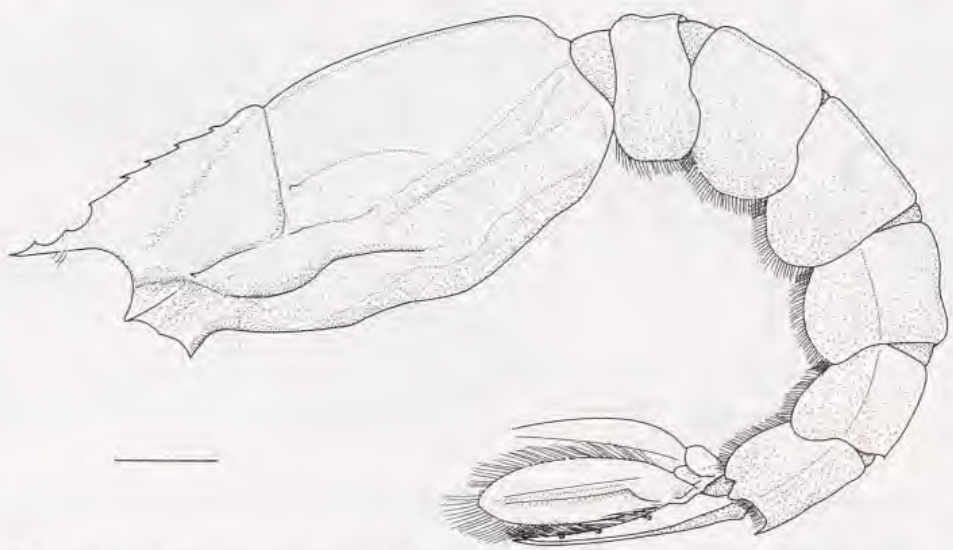

FIG. 107. — *Gordonella polyarthra* (= *G. villosa*), holotype, ♀ 58 mm cl, southern Arabian Sea. Lateral view. Scale = 10 mm. (Adapted from TIRMIZI, 1960, Fig. 86).

Source : MNHN, Paris

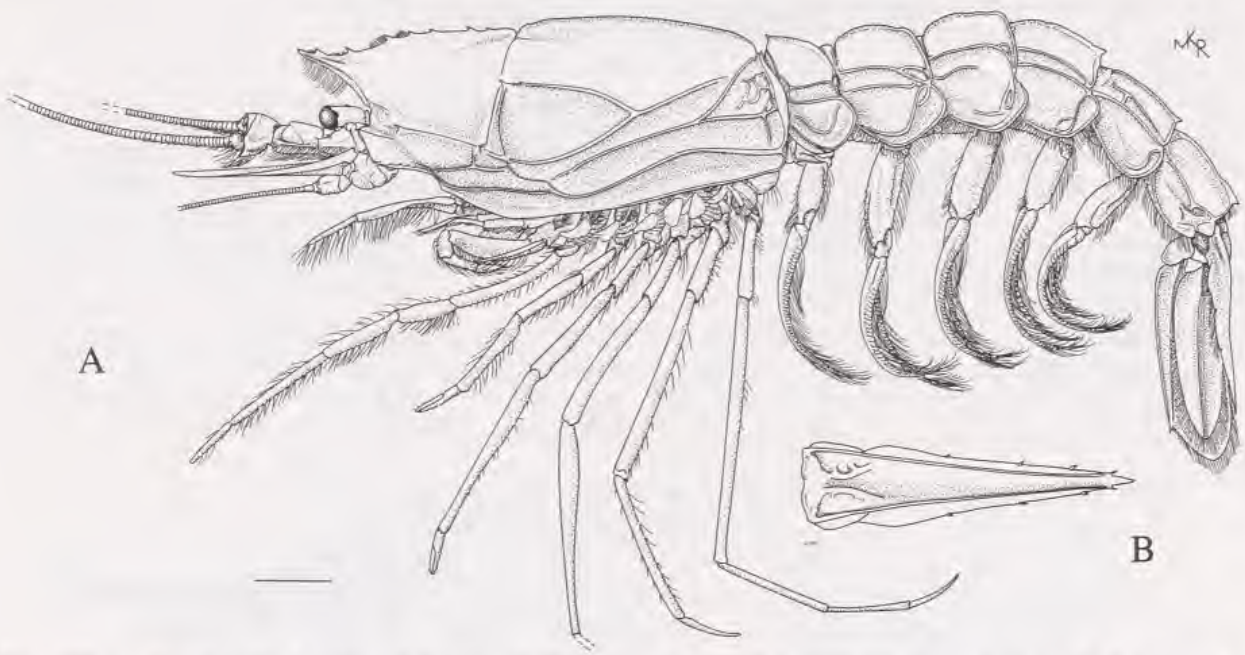

FIG. 108. — *Gordonella kensleyi*, holotype, ♀ 53.3 mm cl, New Caledonia: **A**, Lateral view. **B**, Telson, dorsal view. Scale = 10 mm.

TYPE SPECIES: By monotypy, *Gordonella polyarthra* Tirmizi, 1960, Scient. Rep. John Murray Exped. 1933-34, 10(7): 373 [= *Haliporus villosus* Alcock and Anderson, 1894].

TYPE LOCALITY: Southern Arabian Sea, 4°47'42"N, 72°35'36"E, 2727 m.

GENDER: Feminine.

DIAGNOSIS. — Integument glabrous or pubescent, soft, but carapace and abdomen reinforced by numerous carinae. Rostrum short, not overreaching second antennular segment, with dorsal teeth only; epigastric tooth separated from first rostral by more or less conspicuous interval. Carapace high, distinctly convex posterior to cervical sulcus, with antennal, postantennal, postcervical, hepatic, and pterygostomian spines present, postcervical spine and sometimes pterygostomian followed by several denticles or spinules; well marked cervical sulcus crossing postrostral carina where forming deep notch; hepatic, branchiocardiac, and branchiostegal sulci clearly defined, postcervical sulcus absent; antennal, postantennal, cervical, hepatic, branchiocardiac, sublateral, subhepatic-branchiostegal, and submarginal carinae present. Abdomen slender, with dorsomedian carina along entire length, on each somite ending or not in spine. Telson, tapering to point, armed with subapical pair of fixed spines preceded by three pairs of widely spaced spinules.

Eye with well developed cornea, densely pigmented; bearing mesial tubercle; ocular scale reduced. Prosartema absent or well developed but never foliaceous; stylocerite clearly defined; antennular flagella very long, equal, filiform. Mandibular palp triarticulate, first article very short, annular; second very elongate; third slender and much shorter than second. Palp of first maxilla entire. Lateral ramus of uropod with distolateral spine falling conspicuously short of distal margin of lamella.

Petasma open, symmetrical, dorsomedian lobule usually short, about 0.33 length of petasma, ventromedian lobule markedly curved distally, lateral lobule without conspicuous distal thickenings. Appendix masculina longer than appendix interna, latter somewhat flattened, basis

Source : MNHN, Paris

of pleopod produced distolaterally into foliaceous projection or spur. Thelycum open, with strong protuberance on sternite XIV and smaller one on sternite XIII.

Distribution of branchiae, epipods, and exopods in the genus *Gordonella**

Somite	VII (Mxp1)	VIII (Mxp2)	IX (Mxp3)	X (P1)	XI (P2)	XII (P3)	XIII (P4)	XIV (P5)
Pleurobranchiae	-	-	1	1	1	1	1	1
Arthrobranchiae	s	2	2	2	2	2	2	-
Podobranchiae	-	1	-	-	-	-	-	-
Epipods	1	1	1	1	1	1	1	-
Exopods	1	1	s	r	r	r	r	r

*Above formula applies to *G. kensleyi* and *G. paravillosa*; that of *G. villosa* unknown.

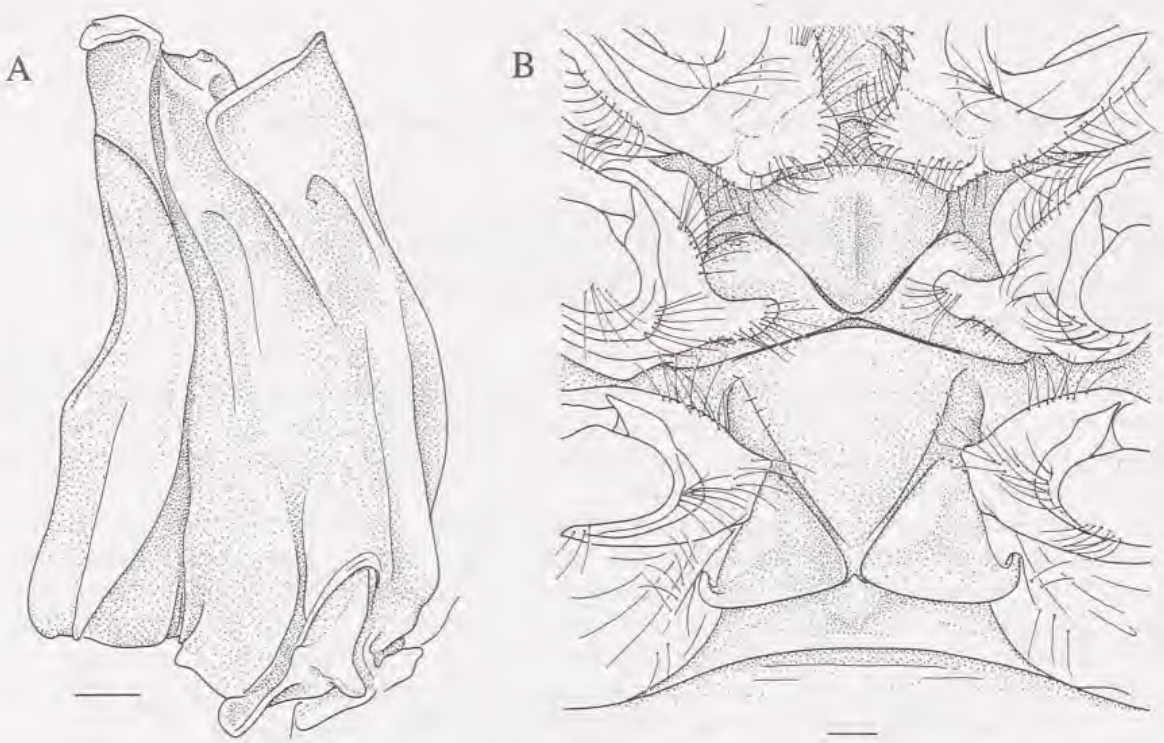

FIG. 109 A. — *Gordonella paravillosa*, ♂ 46 mm cl, Gulf of Boni, Celebes, Indonesia. Petasma, dorsolateral view of right half. Scale = 1 mm.

FIG. 109 B. — *Gordonella kensleyi*, holotype, ♀ 53.5 mm cl, New Caledonia. Thelycum. Scale = 1 mm.

SPECIES. — *Gordonella kensleyi* Crosnier, 1988. South-east Atlantic Ocean off Cape of Good Hope; south of Mozambique; New Caledonia.

Gordonella paravillosa Crosnier, 1988. Celebes, Indonesia; east coast of Australia.

Gordonella villosa (Alcock and Anderson, 1894). North-west Indian Ocean in vicinity of Laccadive Islands; north of Chagos Archipelago.

Source : MNHN, Paris

Genus ***Hadropenaeus*** Pérez Farfante, 1977
Figures 110-112

Solenocera - BATE, 1881, Ann. Mag. nat. Hist., (5)8: 185 [part].
Hymenopenaeus - SMITH, 1885b, Proc. U. S. natn. Mus., 8(11/12): 179 [part]. — BURKENROAD, 1936b, Bull. Bingham oceanogr. Coll., 5(2): 102 [part]. — KUBO, 1949, J. Tokyo Coll. Fish., 36(1): 212 [part].
Philonicus - BATE, 1888, Rep. scient. Results Voy. Challenger, 24: 273 [part].
Pleoticus - BATE, 1888, Rep. scient. Results Voy. Challenger, 24: xii [part, excluding *Philonicus mülleri* Bate, 1888 = *Pleoticus muelleri* (Bate, 1888), and *Philonicus pectinatus* Bate, 1888 = *Solenocera pectinata* Bate, 1888].
Haliporus - BOUVIER, 1906b, Bull. Mus. océanogr. Monaco, 81: 1 [part]. — A. MILNE EDWARDS and BOUVIER, 1909, Mem. Mus. comp. Zool. Harv., 27: 206 [part]. — DE MAN, 1911, Siboga Exped., 39a: 31.
Hadropenaeus Pérez Farfante, 1977a, Fish. Bull., U. S., 75(2): 315. — LIU and ZHONG, 1983, Chin. J. Oceanol. Limnol., 1(2): 172. — HAYASHI, 1992, Dendr. Crust. Jap. Waters, : 170.

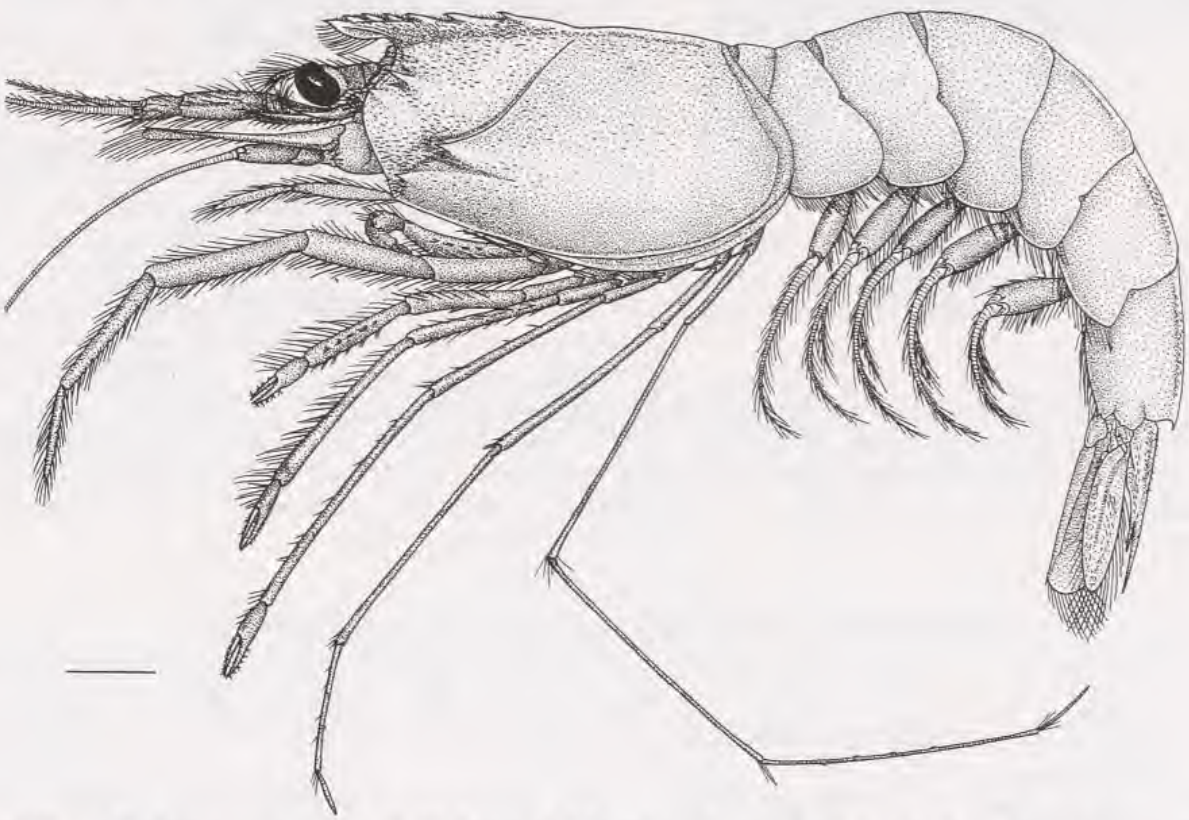

FIG. 110. — *Hadropenaeus affinis*, ♀ 21.5 mm cl, Mona Lisa Passage, off Puerto Rico. Lateral view (third pereopod slightly raised). Scale = 5 mm. (From PÉREZ FARFANTE, 1977).

TYPE SPECIES: By original designation, *Hymenopenaeus modestus* Smith, 1885b, Proc. U. S. natn. Mus., 8(11/12): 183.

TYPE LOCALITY: [Off Bethany Beach, Delaware], 38°31'N, 73°21'W, 285 m.

GENDER: Masculine.

DIAGNOSIS. — Body stout, integument firm. Rostrum short, not overreaching distal margin of first antennular segment, deep, ventral margin pronouncedly convex; armed with dorsal teeth

Source : MNHN, Paris

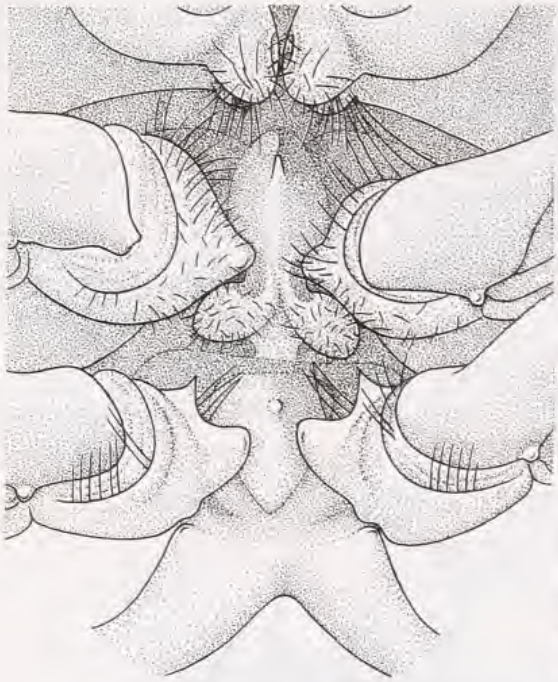

FIG. 111. — *Hadropenaeus affinis*, ♀ 19 mm cl, east of Cape Island, South Carolina. Thelycum. Scale = 1 mm. (From PÉREZ FARFANTE, 1977).

only; epigastric tooth and first rostral separated by interval equal to, or only slightly greater than that between first and second rostral teeth. Carapace proportionately short; orbital and pterygostomian spines absent; postorbital, antennal, hepatic, and branchiostegal spines present. Cervical sulcus long, almost reaching middorsum of carapace; hepatic sulcus deep, subhorizontal posteriorly, inclined anteroventrally from depressed area below hepatic carina; branchiocardiac carina and sulcus absent; posthepatic and submarginal carinae lacking. Telson with pair of conspicuous fixed lateral spines.

Prosartema long, flexible; antennular flagella longer than carapace, usually subcylindrical, ventral flagellum occasionally depressed. Mandibular palp biarticulate, articles moderately broad, distal one as long as or slightly shorter than basal, and tapering to blunt apex. Palp of first maxilla entire, gently narrowing to rounded apex, lateral margin with brush of short setae, mesial margin bearing row of longer setae, and apex with considerably longer ones. Fifth pereopod subflagelliform and considerably longer than fourth. Basial, ischial, and meral spines on first pereopod. Exopods well developed on all maxillipeds and pereopods. Lateral ramus of uropod armed with distolateral spine reaching distal margin of lamella. Single arthrobranch on somite VII small, bearing numerous branched filaments.

Petasma semi-open, symmetrical, with ventral costa free from heavily sclerotized, platelike terminal part of ventrolateral lobule. Appendix masculina and appendix interna present; basis of second pleopod produced distally into subelliptical or paddlelike ventrolateral spur. Thelycum open.

Distribution of branchiae, epipods, and exopods in the genus *Hadropenaeus*.

Somite	VII (Mxp1)	VIII (Mxp2)	IX (Mxp3)	X (P1)	XI (P2)	XII (P3)	XIII (P4)	XIV (P5)
Pleurobranchiae	-	-	1	1	1	1	1	1
Arthrobranchiae	s	2	2	2	2	2	2	-
Podobranchiae	-	1	-	-	-	-	-	-
Epipods	1	1	1	1	1	1	1	-
Exopods	1	1	1	1	1	1	1	1

SPECIES. — *Hadropenaeus affinis* (Bouvier, 1906b). Western Atlantic Ocean from North Carolina to Florida; Gulf of Mexico; Caribbean; Cape Verde Islands.

Hadropenaeus lucasii (Bate, 1881). Madagascar; Maldive Islands; India; Indonesia; South China Sea; Philippines; Japan; New Guinea; New South Wales, Australia; Hawaii; Wallis and Futuna Islands.

Source : MNHN, Paris

Hadropenaeus modestus (Smith, 1885b). Western Atlantic Ocean from Delaware to Florida, Gulf of Mexico, Bahamas, Caribbean, and northern Brazil.

Hadropenaeus spinicauda Liu and Zhong, 1983. South China Sea.

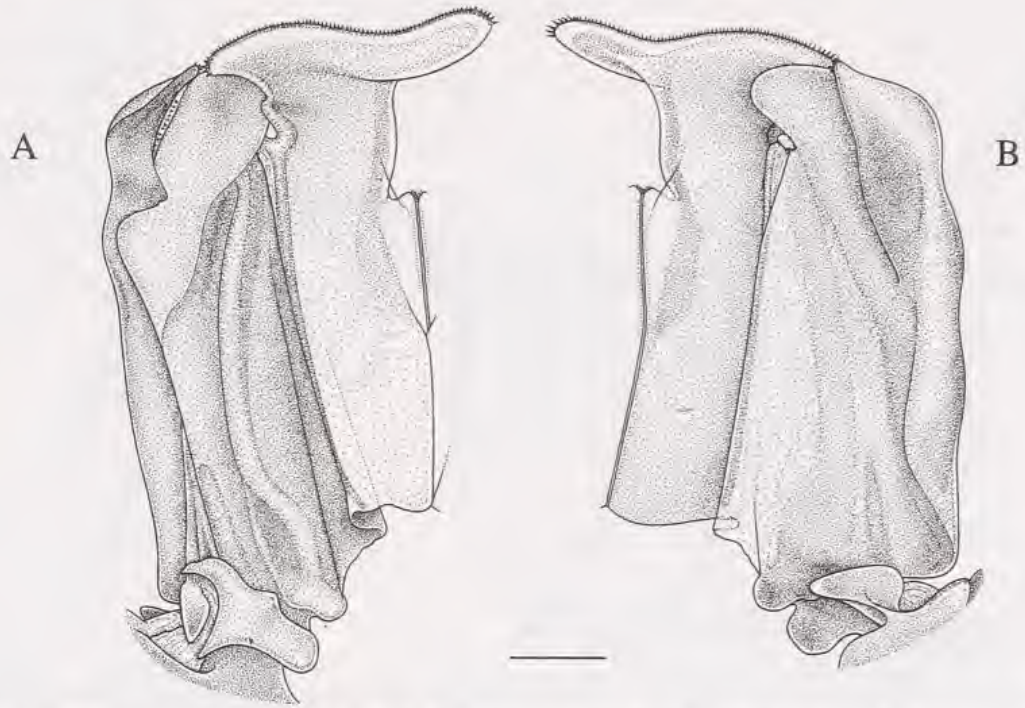

FIG. 112. — *Hadropenaeus affinis*, ♂ 16 mm cl, southeast of Cape Fear, North Carolina: **A**, Petasma, dorsal view of right half. **B**, Petasma, ventral view. Scale = 1 mm. (From PÉREZ FARFANTE, 1977).

Genus ***Haliporoides*** Stebbing, 1914

Figures 113-114

Penaeopsis - FAXON, 1893, Bull. Mus. comp. Zool. Harv., 24(1): 212.

Faxonia - BOUVIER, 1905a, C. r. hebd. Séanc. Acad. Sci., Paris, 140: 981 [part, excluding type species, *Penaeopsis ocularis* Faxon, 1895 = *Pleoticus robustus* (Smith, 1885b)].

Haliporus - BOUVIER, 1906b, Bull. Mus. océanogr. Monaco, 81: 1 [part]. — DE MAN, 1911, Siboga Exped., 39a: 31 [part].

Haliporoides Stebbing, 1914, Ann. S. Afr. Mus., 15: 20. — PÉREZ FARFANTE, 1977a, Fish. Bull., U. S., 75(2): 289. — DE FREITAS, 1985, Invest. Rep. oceanogr. Res. Inst. Durban, 57: 37. — HAYASHI, 1992, Dendr. Crust. Jap. Waters, : 174.

Hymenopenaeus - BURKENROAD, 1936b, Bull. Bingham oceanogr. Coll., 5(2): 102 [part]. — CROSNIER, 1978, Faune Madagascar, 46: 108, 112 [part].

Parahaliporus Kubo, 1949, J. Tokyo Coll. Fish., 36(1): 207. Type species: by original designation, *Parahaliporus sibogae* De Man, 1907 [= *Haliporus sibogae* De Man, 1907], Notes Leyden Mus., 29(2): 138. Type locality: Syntypes from four localities from East Flores Sea to Kai Islands (type locality not restricted). Gender: Masculine.

Hymenopenaeus (Haliporoides) - BARNARD, 1950, Ann. S. Afr. Mus., 38: 619.

TYPE SPECIES: By monotypy, *Haliporoides triarthrus* Stebbing, 1914, Ann. S. Afr. Mus., 15: 21.

Source : MNHN, Paris

TYPE LOCALITY: Off East London NW1/2N, 18 mi (929 km), Cape Province, South Africa, 457-549 m.

GENDER: Masculine.

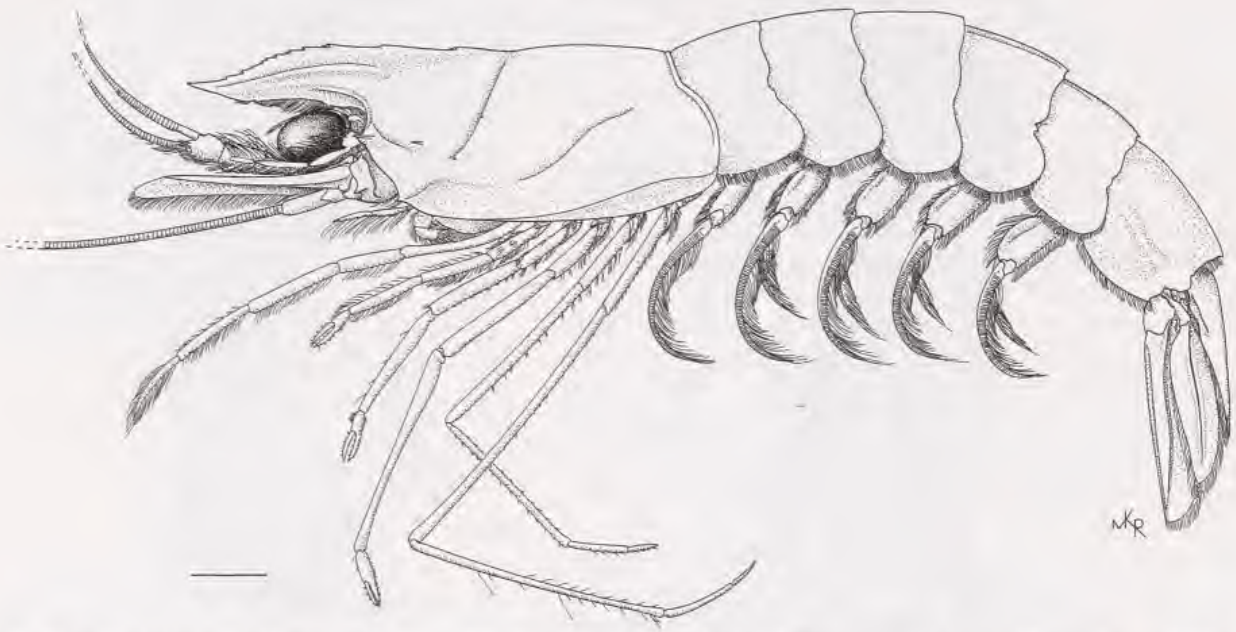

FIG. 113. — *Haliporoides triarthrus vniroi*, ♀ 43 mm cl, off Ilha do Bazaruto, Mozambique. Lateral view. Scale = 10 mm.

DIAGNOSIS. — Body moderately robust, integument firm. Rostrum relatively long, extending at least to, often beyond, second antennular peduncle segment, ventral margin straight or concave; armed with dorsal and, frequently, with ventral teeth; epigastric tooth separated from rostral teeth by interval noticeably longer than spaces between latter. Carapace relatively elongate; orbital and branchiostegal spines absent; postorbital, antennal, pterygostomian, hepatic, and suprahepatic spines present. Cervical sulcus deep, long, extending to, but not across, middorsum of carapace; hepatic sulcus deep to shallow, hepatic carina sharp to weak, turning anteroventrally from almost horizontal posterior part and reaching base of pterygostomian spine; orbito-antennal sulcus usually well developed, branchiocardiac carina and sulcus well marked; submarginal carina sharp. Telson with pair of conspicuous, subterminal, fixed lateral spines.

Prosartema moderately long, broad and flexible; antennular flagella similar, subcylindrical and long, not less than 3 times carapace length. Mandibular palp triarticulate, proximal article short and narrow, intermediate one larger, scalene triangular in shape, and distal article considerably shorter and narrower than middle one and tapering to blunt apex. Palp of first maxilla entire, gently narrowing to rounded apex, and bearing short proximal setae on lateral margin and subproximal and subapical tufts of longer setae on mesial margin. Fourth and fifth pereopods not flagelliform, about as thick as preceding ones. Basial spine present or lacking on first pereopod. Exopods quite small. Lateral ramus of uropod armed with subterminal distolateral spine. Single arthrobranch on somite VII rather well developed, with numerous branched filaments.

Petasma open, with ventral costa distally fused to flexible flap of ventrolateral lobule. Appendix masculina and appendix interna present; base of endopod of second pleopod produced into very short distolateral spur. Thelycum open.

Source : MNHN, Paris

Distribution of branchiae, epipods, and exopods in the genus *Haliporoides*.

Somite	VII (Mxp1)	VIII (Mxp2)	IX (Mxp3)	X (P1)	XI (P2)	XII (P3)	XIII (P4)	XIV (P5)
Pleurobranchiae	-	-	1	1	1	1	1	1
Arthrobranchiae	r	2	2	2	2	2	2	-
Podobranchiae	-	1	-	-	-	-	-	-
Epipods	1	1	1	1	1	1	1	-
Exopods	1	1	s	r	r	r	r	r

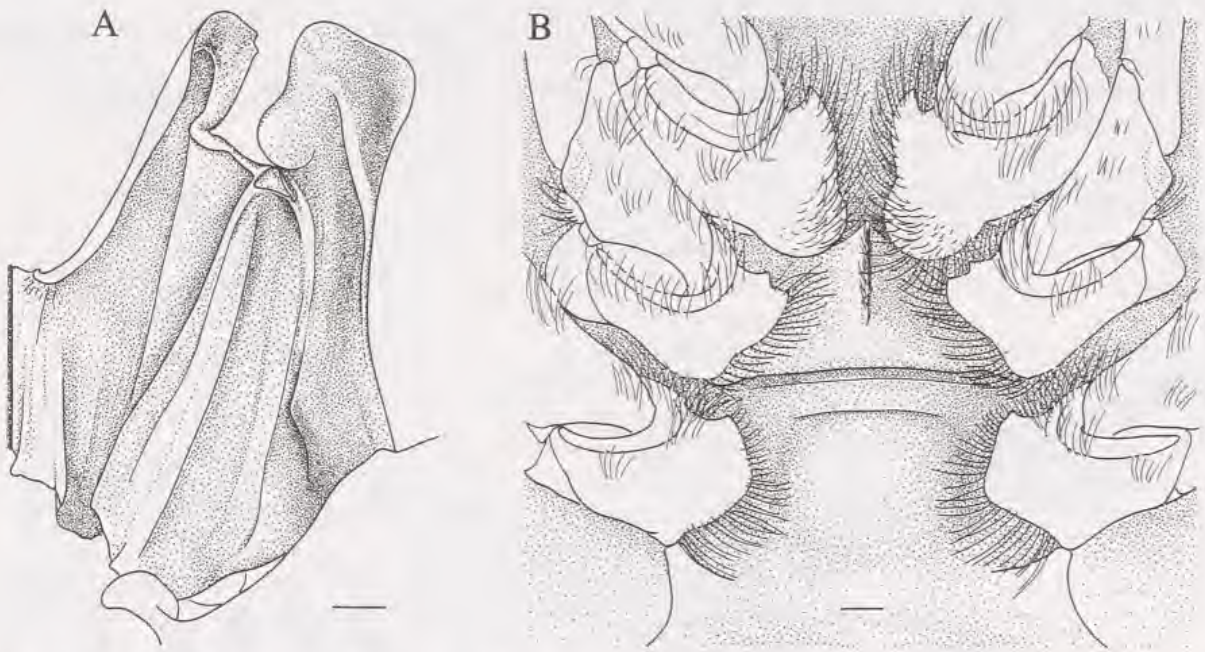

FIG. 114. — *Haliporoides triarthrus vniroi*: **A**, ♂ 36 mm cl, off Ilha do Bazaruto, Mozambique. Petasma, ventral view of left half (extended). — **B**, ♀ 43 mm cl, off Ilha do Bazaruto, Mozambique. Thelycum. Scales = 1 mm.

SPECIES. — *Haliporoides cristatus* Kensley, Tranter, and Griffin, 1987. East coast of Australia.

Haliporoides diomedeae (Faxon, 1893). Eastern Pacific Ocean from Panama to southern Chile.

Haliporoides sibogae australiensis Kensley, Tranter, and Griffin, 1987. South-east and east coast of Australia.

Haliporoides sibogae madagascariensis Crosnier, 1978. Madagascar; Réunion.

Haliporoides sibogae sibogae (De Man, 1907). Malaysia; Indonesia; South China Sea; Taiwan; Philippines; Japan; Australia; New Zealand.

Haliporoides triarthrus triarthrus (Stebbing, 1914). Cape of Good Hope to Natal, South Africa.

Haliporoides triarthrus vniroi Crosnier, 1978. East coast of South Africa; Mozambique.

Source : MNHN, Paris

Genus *Haliporus* Bate, 1881

Figures 115-117

Haliporus Bate, 1881, Ann. Mag. nat. Hist., (5)8: 171, 185 [part]; 1888, Rep. scient. Results Voy. Challenger, 24: 288 [part]. — Faxon, 1893, Bull. Mus. comp. Zool. Harv., 24(7): 213 [part]; 1895, Mem. Mus. comp. Zool. Harv., 18: 189. — Alcock and Anderson, 1899, Ann. Mag. nat. Hist., (7)3: 280. — Alcock, 1901, Descr. Cat. Indian Deep-Sea Crust., : 22 [part]. — Bouvier, 1906b, Bull. Mus. océanogr. Monaco, 81: 1 [part]; 1908a, Résult. Camp. scient. Prince Albert I, 33: 78 [part]. — Burkenroad, 1934b, Bull. Am. Mus. Nat. Hist., 6(2): 64 [part]; 1936b, Bull. Bingham oceanogr. Coll., 5(2): 100 [part]. — Pérez Farfante, 1977a, Fish. Bull., U. S., 75(2): 263 [part]. — Crosnier, 1978, Faune Madagascar, 46: 97 [part]. — Burkenroad, 1983, Crust. Issues, 1: 281. — De Freitas, 1985, Investl. Rep. oceanogr. Res. Inst., Durban, 57: 33. — Crosnier, 1988, Bull. Mus. Hist. nat. Paris, (4)10A(3): 563.

Placed on the Official List of Generic Names in Zoology, International Commission on Zoological Nomenclature, 1969, Opinion 864, Name No. 1812, Bull. zool. Nomen., 25(4/5): 139.

Hymenopenaeus - Burkenroad, 1936b, Bull. Bingham Oceanogr. Coll., 5(2): 102 [part]. — Kensley, 1977, Ann. S. Afr. Mus., 74(2): 27.

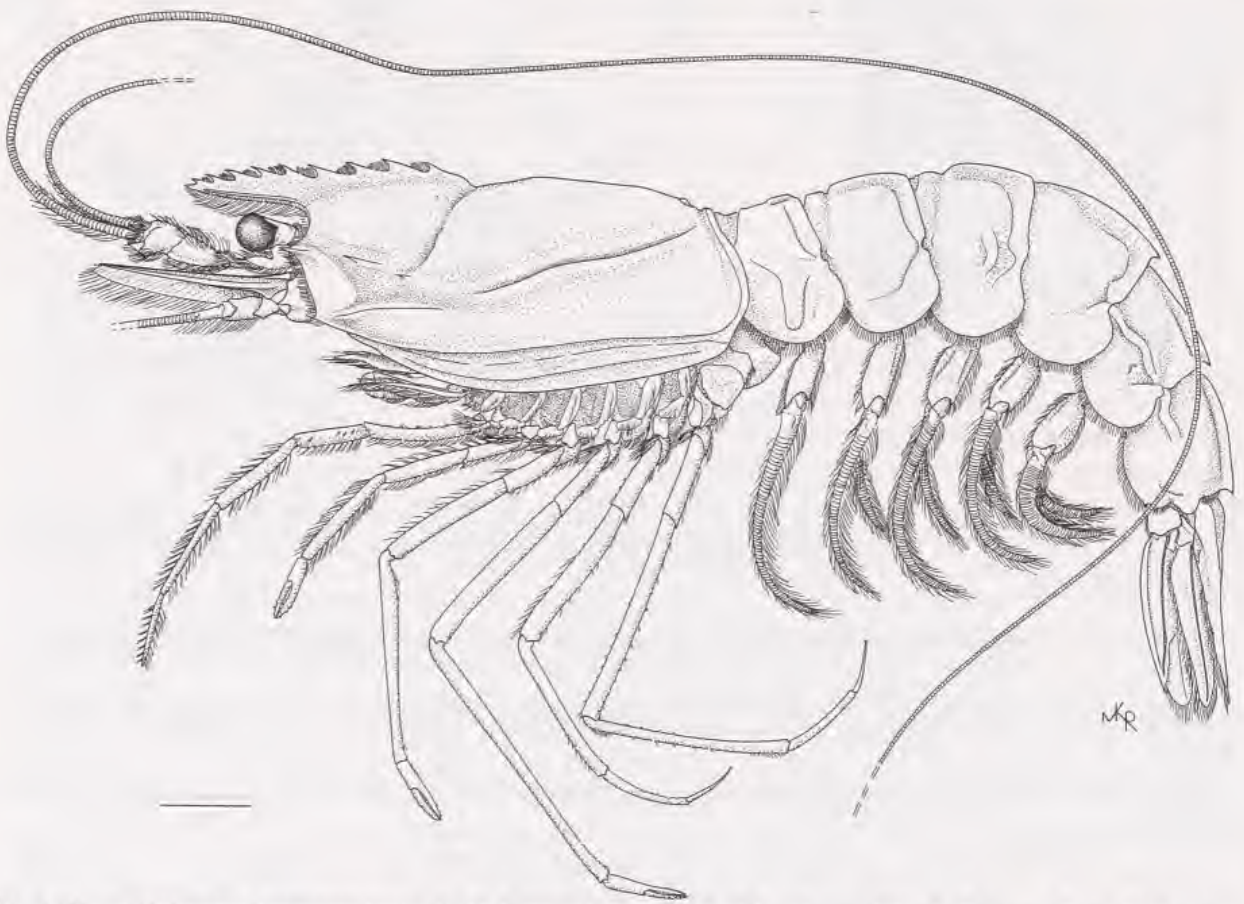

Fig. 115. — *Haliporus taprobanensis*, ♀ 45.5 mm cl, northeast of Sombrero Island, Balayan Bay, Philippines. Lateral view (carapace displaced dorsally). Scale = 10 mm.

Type Species: By subsequent designation, by Fowler, 1912, Ann. Rep. N. J. State Mus., 1911(2): 542, *Haliporus curvirostris* Bate, 1881, Ann. Mag. nat. Hist., (5)8: 185.

Source : MNHN, Paris

TYPE LOCALITY: South of Low Archipelago, Pacific Ocean, 32°36'S, 137°43'W, 4343 m.
GENDER: Masculine.

FIG. 116. — *Haliporus taprobanensis*, ♀ 45.5 mm cl, northeast of Sombrero Island, Balayan Bay, Philippines. Thelycum. Scale = 5 mm.

DIAGNOSIS. — Integument glabrous or pubescent. Rostrum short or moderately long, not overreaching third antennular segment, laterally compressed, with dorsal teeth only; epigastric tooth separated from first rostral by interval equal to or slightly longer than that between first and second teeth. Carapace moderately high, with long shallow dorsomedian depression at level of cervical sulcus; antennal, postantennal, hepatic, and pterygostomian spines present; postcervical spine lacking; well marked cervical sulcus crossing postrostral carina where forming deep notch; postcervical sulcus absent, antennal and hepatic carinae variable in length, long branchiocardiac carina accompanied by well marked sulcus. Abdomen slender, bearing dorsomedian carina on all somites, on each one ending or not in spine. Telson tapering to terminal point, armed with pair of subapical spines preceded by three pairs of marginal, movable spinules relatively widely spaced.

Eye with cornea broader than, or same width as, optical calathus, only slightly pigmented, bearing mesial tubercle; ocular scale indistinct or small. Prosartema little or well developed, never foliaceaous; stylocerite well developed; antennular flagella very long, equal, filiform. Mandibular palp triarticulate, first article very short, second article long and very broad, third slender and shorter than second. Palp of first maxilla entire. Fourth pereopod slightly shorter or longer than preceding one. Lateral ramus of uropod with strong distolateral spine falling conspicuously short of distal margin of lamella.

Distribution of branchiae, epipods, and exopods in the genus *Haliporus*.*

Somite	VII (Mxp1)	VIII (Mxp2)	IX (Mxp3)	X (P1)	XI (P2)	XII (P3)	XIII (P4)	XIV (P5)
Pleurobranchiae	-	-	1	1	1	1	1	1
Arthrobranchiae	s	2	2	2	2	2	2	-
Podobranchiae	-	1	s	1 (-)	1 (-)	1 (-)	-	-
Epipods	1	1	1	1	1	1	1	-
Exopods	1	1	1	1	1	1	1	1

* In *H. curvirostris*, podobranchia on first pereopod small, that on second and third pereopods vestigial, exopods of pereopods rudimentary. In *H. taprobanensis*, podobranchia on third maxilliped usually small, but size variations have been observed, as in those of the first and second pereopods (CROSNIER, 1988). In *H. thetis*, podobranchia of first three pairs of pereopods small.

Source : MNHN, Paris

Petasma open, symmetrical, dorsomedian lobule short or very short, 0.15-0.30 length of petasma; ventromedian lobule elongate, ending in outwardly curved spatula, dorsolateral lobule sinuous distally, ventrolateral lobule distally free from contiguous lobule, relatively narrow to broadened and slightly to strongly curved. Endopod of second pleopod bearing appendix masculina, latter longer than appendix interna, with two or three concave surfaces; appendix interna subcylindrical or flattened; basis of pleopod produced laterally into foliaceous projection or spur more or less curved distally. Thelycum open, with strong protuberance on sternite XIV and smaller one on sternite XIII.

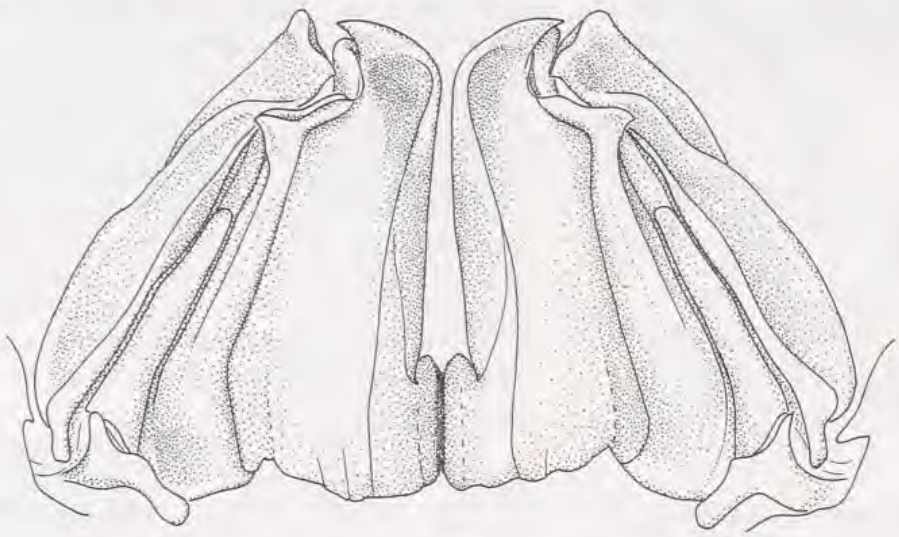

FIG. 117. — *Haliporus taprobanensis*, ♂ 23 mm cl, Diuata Point, Philippines. Petasma (extended), dorsal view. Scale = 5 mm.

SPECIES. — *Haliporus curvirostris* Bate, 1881. North-east of Mariana Islands; south-west of Tuamotu Archipelago; north-west Pacific Ocean.

Haliporus taprobanensis Alcock and Anderson, 1899. Off Natal, South Africa; Madagascar; India; Indonesia; Philippines.

Haliporus thetis Faxon, 1893. North-west of Madagascar; Réunion; central Indian Ocean; India; Galapagos Islands.

Genus ***Hymenopenaeus*** Smith, 1882

Figures 118-120

Haliporus - BATE, 1881, Ann. Mag. nat. Hist., (5)8: 185 [part, excluding *Haliporus curvirostris* Bate, 1881]. — BATE, 1888, Rep. scient. Results Voy. Challenger, 24: 284 [part]. — ALCOCK, 1901, Descr. Cat. Indian Deep-Sea Crust., : 22 [part]. — BOUVIER, 1906b, Bull. Mus. océanogr. Monaco, 81: 1 [part]; 1908a, Résult. Camp. scient. Prince Albert I, 33: 78 [part]. — A. MILNE EDWARDS and BOUVIER, 1909, Mem. Mus. comp. Zool. Harv., 27: 206. — DE MAN, 1911, Siboga Exped., 39a: 31 [part].

Hymenopenaeus Smith, 1882, Bull. Mus. comp. Zool. Harv., 10(1): 91. — BURKENROAD, 1936b, Bull. Bingham oceanogr. Coll., 5(2): 102 [part]. — KUBO, 1949, J. Tokyo Coll. Fish., 36(10): 212 [part]. — HOLTHUIS, 1962, Bull. zool. Nom., 19(2): 108. — PÉREZ FARFANTE, 1977a, Fish. Bull., U. S., 75(2): 263-266. —

Source : MNHN, Paris

CROSNIER, 1978, Faune Madagascar, 46: 100. — DE FREITAS, 1985, Invest. Rep. oceanogr. Res. Inst. Durban, 57: 28. — LIU and ZHONG, 1988, Pen. Shr. S. China Sea, : 179. — HAYASHI, 1992, Dendr. Crust. Jap. Waters, : 179.

Placed on the Official List of Generic Names in Zoology, International Commission on Zoological Nomenclature, 1969, Opinion 864, Name No. 1816, Bull. zool. Nom., 25(4/5): 139.

Hymenopeneus - BURKENROAD, 1983, Crust. Issues, 1: 281.

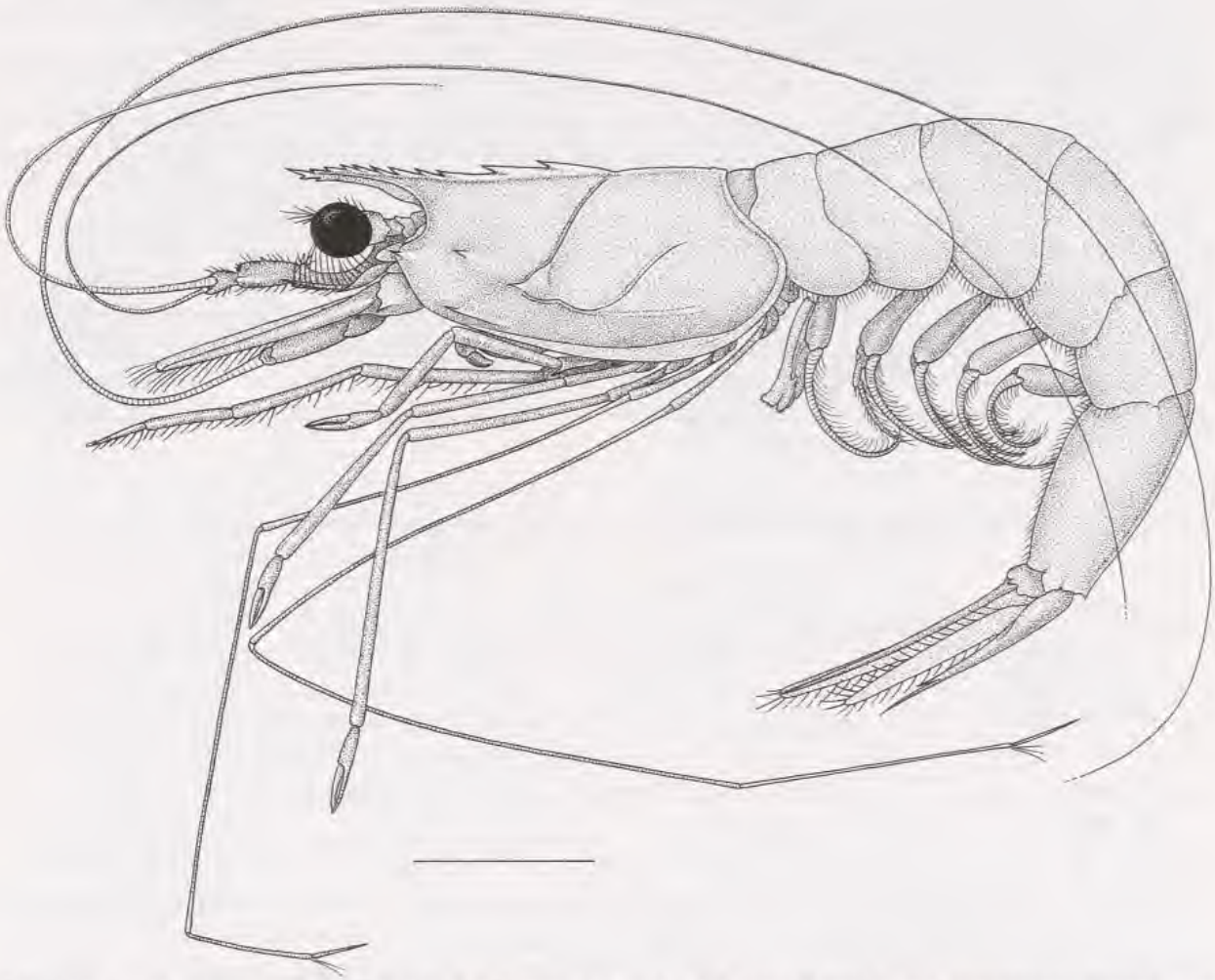

FIG. 118. — *Hymenopenaeus debilis*, ♂ 8.5 mm cl, south of Grand Terre Island, Louisiana. Lateral view. Scale = 5 mm. (From PÉREZ FARFANTE, 1977).

TYPE SPECIES: By monotypy, *Hymenopenaeus debilis* Smith, 1882, Bull. Mus. comp. Zool. Harv., 10(1): 91.

TYPE LOCALITY: Syntypes from three localities, off Georgia and North Carolina, U.S.A. (type locality not restricted).

GENDER: Masculine.

DIAGNOSIS. — Body slender, integument thin, flexible and glabrous, rarely with photophores. Rostrum variable in length, reaching between distal 0.25 length of first antennular segment and end of peduncle; ventral margin straight; usually armed with dorsal teeth only, occasionally also with ventral teeth; epigastric and first rostral teeth separated from remaining teeth by relatively

Source : MNHN, Paris

long interval. Carapace short to moderately long; orbital spine lacking; postorbital, antennal, hepatic, and branchiostegal spines present; pterygostomian, suprahepatic, and post-cervical spines present or absent. Cervical sulcus deep, long, extending to, but not across, middorsum of carapace, accompanying carina sharp; hepatic sulcus and carina well marked posteriorly, present or absent anteriorly; branchiocardiac carina sharp, accompanying sulcus deep; posthepatic and submarginal carinae present. Telson armed with pair of conspicuous, fixed, subapical spines.

Prosartema long, flexible; antennular flagella similar, filiform and longer than carapace. Mandibular palp triarticulate, articles relatively narrow, proximal one very small, distalmost much shorter than middle one and tapering to apex. Palp of first maxilla entire, gently narrowing to blunt apex and bearing proximal, inconspicuous setose lobule on lateral margin and with mesial margin broadly rounded or produced into lobule proximally and smoothly concave or bearing small lobule distally, both lobules fringed with shorter setae than those of apical tuft. Fourth and fifth pereopods extremely long and flagelliform. Basial spine and usually ischial spine on first pereopod. Only one arthrobranchia on somite VII. Exopods small. Lateral ramus of uropod armed with distolateral spine reaching distal margin of lamella (terminal spine).

Petasma semi-open, with distal part of ventral costa fused to flexible flap of ventrolateral lobule; ventromedian lobule usually produced into paired conspicuous processes distally. Appendix masculina usually foliaceous and produced proximolaterally into conspicuous lobe; appendix interna elongate-ovate; basis of pleopod produced distally into ventrolateral spur. Thelycum open, with sternite XIV raised in median protuberance or strong ridge and sternite XIII often bearing conspicuous median plate.

Distribution of branchiae, epipods, and exopods in the genus *Hymenopenaeus*.

Somite	VII (Mxp1)	VIII (Mxp2)	IX (Mxp3)	X (P1)	XI (P2)	XII (P3)	XIII (P4)	XIV (P5)
Pleurobranchiae	-	-	1	1	1	1	1	1
Arthrobranchiae	r or s	2	2	2	2	2	2	-
Podobranchiae	-	1	-	-	-	-	-	-
Epipods	1	1	1	1	1	1	1	-
Exopods	1	1	1	1	1	1	1	1

SPECIES. — *Hymenopenaeus aphoticus* Burkenroad, 1936b. Western Atlantic Ocean from Florida to Gulf of Mexico; Caribbean Sea; Azores; Morocco.

Hymenopenaeus chacei Crosnier and Forest, 1969. North-east Atlantic Ocean from Mauritania to Angola.

Hymenopenaeus debilis Smith, 1882. North-western Atlantic Ocean from New Jersey to Gulf of Mexico; West Indies; Belize; Nicaragua; Panama; Venezuela; Colombia; Guyana; north-east Atlantic Ocean off Azores; Cape Verde Islands; Canary Islands; Morocco.

Hymenopenaeus doris (Faxon, 1893). Eastern Pacific Ocean from Baja California, Gulf of California, Isla del Coco, Costa Rica to Guanape, Peru.

Hymenopenaeus equalis (Bate, 1888). East coast of Africa; Arabian Sea; Sri Lanka; Andaman Islands; Indonesia; South China Sea; Philippines; Taiwan; Japan; Wallis and Futuna Islands; Hawaii.

Hymenopenaeus fattahi Ramadan, 1938. Arabian Sea.

Hymenopenaeus furici Crosnier, 1978. Madagascar.

Source : MNHN, Paris

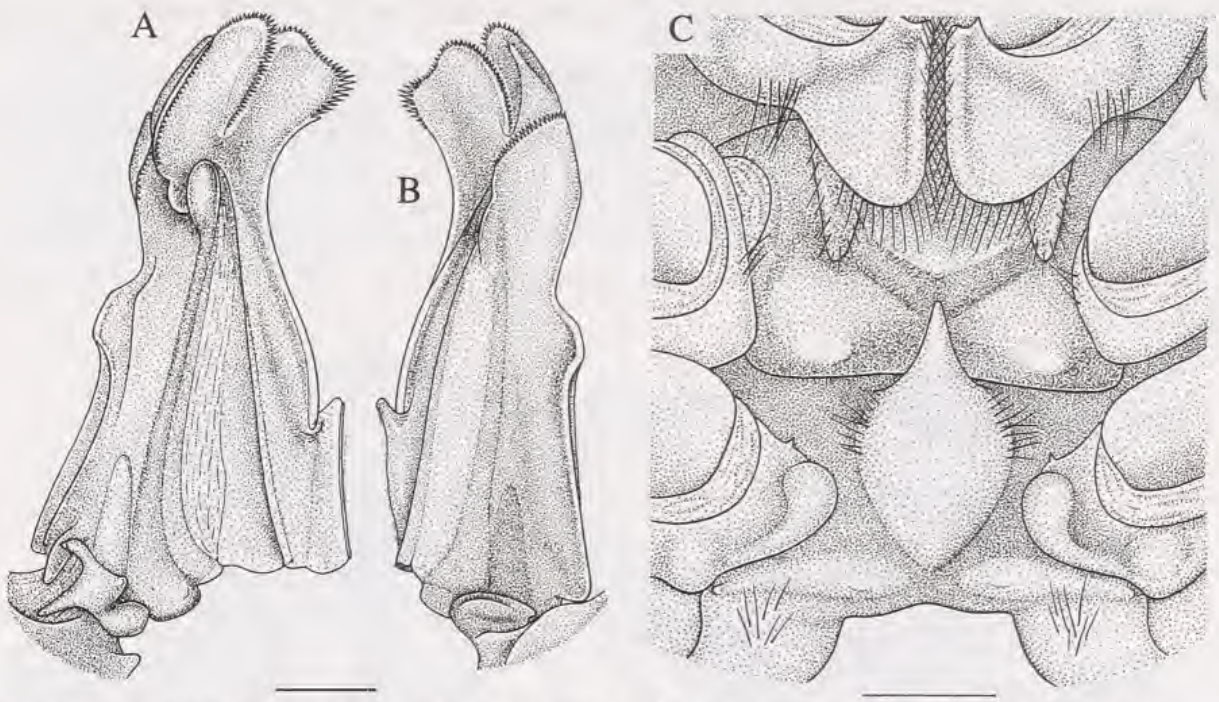

FIG. 119. — *Hymenopenaeus debilis*: **A-B**, ♂ 13 mm cl, off Cape Canaveral, Florida. **A**, Petasma, dorsolateral view of left half. **B**, *Idem*, ventral view. — **C**, ♀ 15.5 mm cl, off Dominica Island, Lesser Antilles. Thelycum. Scales = 1 mm. (From PÉREZ FARFANTE, 1977).

Hymenopenaeus halli Bruce, 1966. Off Natal, South Africa; Madagascar; Indonesia; South China Sea; Philippines; Japan; New South Wales, Australia; Wallis and Futuna Islands.

Hymenopenaeus laevis (Bate, 1881). Western Atlantic Ocean from Massachusetts to Bahamas; Bermuda; eastern Atlantic Ocean from Mauritania to Equatorial Guinea; Arabian Sea; Bay of Bengal; Philippines; north-west Pacific Ocean.

Hymenopenaeus neptunus (Bate, 1881). Bay of Bengal; Indonesia; Philippines; Wallis and Futuna Islands.

Hymenopenaeus nereus (Faxon, 1893). Eastern Pacific Ocean from Costa Rica to Ecuador; Galapagos Islands.

Hymenopenaeus obliquirostris (Bate, 1881). Indonesia; off Kermadec Islands; Hawaii.

Hymenopenaeus propinquus (De Man, 1907). Zanzibar; Gulf of Aden; Madagascar; Réunion; Maldive Islands; Saya de Malha Bank; Indonesia; South China Sea; Philippines; New South Wales, Australia; Wallis and Futuna Islands.

Hymenopenaeus sewelli Ramadan, 1938. Maldive Islands; central Indian Ocean.

Hymenopenaeus tuerkayi Crosnier, 1995. Red Sea.

Genus ***Mesopenaeus*** Pérez Farfante, 1977

Figures 120-121

Parartemesia - BOUVIER, 1905b, C. r. hebd. Séanc. Acad. Sci., Paris, 141: 747 [part, excluding *Parartemesia carinata* Bouvier, 1905b = *Pleoticus muelleri* (Bate, 1888)].

Source : MNHN, Paris

Haliporus - BOUVIER, 1906b, Bull. Mus. océanogr. Monaco, 81: 1 [part]. — A. MILNE EDWARDS and BOUVIER, 1909, Mem. Mus. comp. Zool. Harv., 27: 206 [part].

Hymenopenaeus - BURKENROAD, 1936b, Bull. Bingham oceanogr. Coll., 5(2): 102 [part].

Mesopenaeus Pérez Farfante, 1977a, Fish. Bull., U. S., 75(2): 331. — PÉREZ FARFANTE and IVANOV, 1982, J. Crust. Biol., 2(2): 303. — CROSNIER, 1986b, Indo-Malayan Zool., 3: 19. — HAYASHI, 1992, Dendr. Crust. Jap. Waters, : 184.

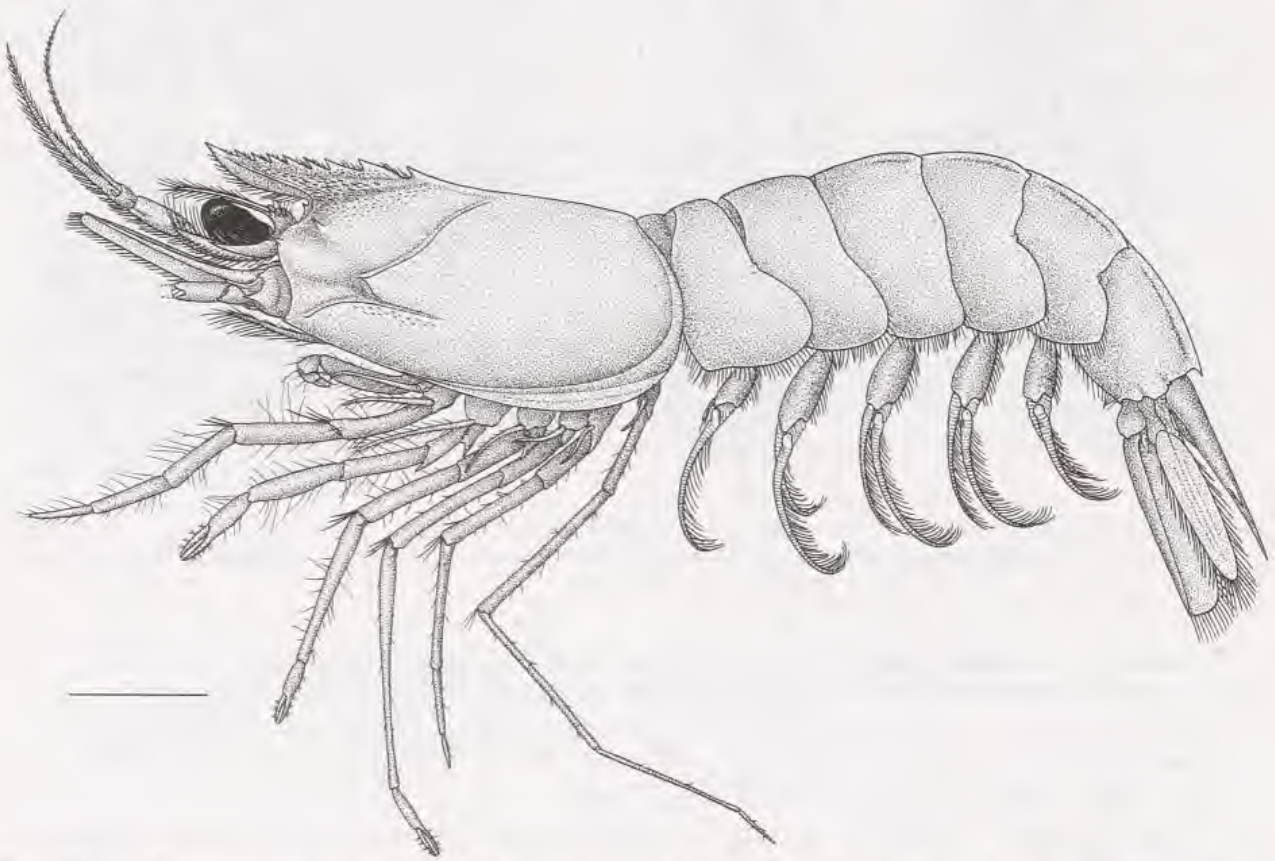

FIG. 120. — *Mesopenaeus tropicalis*, ♀ 25 mm cl, east of Cayos de Albulquerque, Colombia. Lateral view. Scale = 10 mm. (From PÉREZ FARFANTE, 1977).

TYPE SPECIES: By original designation, *Parartemesia tropicalis* Bouvier, 1905b, C. r. hebd. Séanc. Acad. Sci., Paris, 141: 748.

TYPE LOCALITY: Gulf of Mexico, exact position indeterminable [see PÉREZ FARFANTE, 1977a, Fish. Bull., U. S., 75(2): 341].

GENDER: Masculine.

DIAGNOSIS. — Body stout, integument firm. Rostrum short, not overreaching base of second antennular segment, deep, with ventral margin pronouncedly convex; armed with dorsal teeth only; epigastric and first rostral separated by interval similar to, or only slightly longer than that between first and second rostral teeth. Carapace proportionately short; orbital, postorbital, antennal, and hepatic spines present; pterygostomian, branchiostegal, and suprahepatic spines absent. Cervical sulcus long, almost reaching middorsum of carapace; hepatic sulcus deep, nearly horizontal posteriorly to level of hepatic spine, from there turning anteroventrally and reaching pterygostomian region; hepatic carina sharp anteriorly, indistinct posteriorly; branchiocardiac

Source : MNHN, Paris

carina and sulcus, posthepatic and submarginal carinae lacking. Telson with pair of conspicuous, fixed, posterolateral spines.

Prosartema long and flexible; antennular flagella shorter to slightly longer than carapace and dissimilar; dorsal flagellum subcylindrical and slender, ventral flagellum conspicuously depressed. Mandibular palp biarticulate, articles broad, distal nearly as long as penultimate one and tapering to blunt apex. Fourth and fifth pereopods rather stout proximally, slender distally, fifth usually moderately, instead of considerably longer than fourth. Basial and ischial spines on first pereopod. Exopods well developed. Lateral ramus of uropod armed with terminal (reaching distal margin of lamella) distolateral spine. Single arthrobranch on somite VII rudimentary.

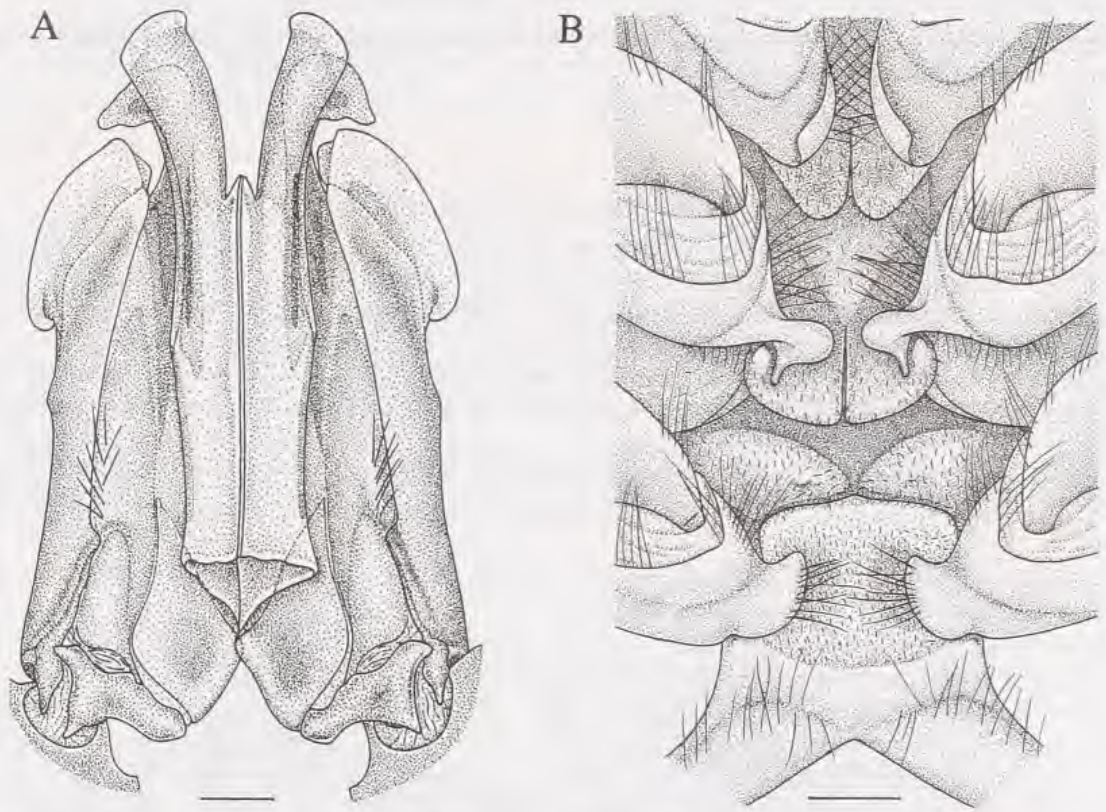

FIG. 121. — *Mesopenaeus tropicalis*: **A**, ♂ 17.5 mm cl, east of Cayos de Albulquerque, Colombia. Petasma, dorsal view. (From PÉREZ FARFANTE, 1977). — **B**, ♀ 25 mm cl, east of Cayos de Albulquerque, Colombia. Thelycum. Scales = 1 mm. (From PÉREZ FARFANTE, 1977).

Distribution of branchiae, epipods, and exopods in the genus *Mesopenaeus*.

Somite	VII (Mxp1)	VIII (Mxp2)	IX (Mxp3)	X (P1)	XI (P2)	XII (P3)	XIII (P4)	XIV (P5)
Pleurobranchiae	-	-	1	1	1	1	1	1
Arthrobranchiae	r	2	2	2	2	2	2	-
Podobranchiae	-	1	-	-	-	-	-	-
Epipods	1	1	1	1	1	1	1	-
Exopods	1	1	1	1	1	1	1	1

Source : MNHN, Paris

Petasma semi-open, with ventral costa free or attached to adjacent membranous part and bearing terminal flap. Appendix masculina and appendix interna present; basis of pleopod produced distally into elongate ventrolateral spur. Thelycum open, with paired anterior protuberances, more or less elevated, on sternite XIV.

Descriptions and illustrations of the complex spermatophores of *M. tropicalis* and *M. mariae* are provided by PÉREZ FARFANTE (1977a) and PÉREZ FARFANTE and IVANOV (1982), respectively.

SPECIES. — *Mesopenaeus brucei* Crosnier, 1986b. Japan; Queensland and north-western Australia.

Mesopenaeus mariae Pérez Farfante and Ivanov, 1982. Southern Mozambique; off Saya de Malha Bank, Indian Ocean; Taiwan; Japan; Wallis and Futuna Islands.

Mesopenaeus tropicalis (Bouvier, 1905a). Western Atlantic Ocean from North Carolina to southern Brazil; Gulf of Mexico.

Genus ***Pleoticus*** Bate, 1888

Figures 122-123

Hymenopenaeus - SMITH, 1885b, Proc. U. S. natn. Mus., 8(11/12): 179 [part]. — BURKENROAD, 1936b, Bull. Bingham oceanogr. Coll., 5(2): 102 [part].

Philonicus Bate, 1888, Rep. scient. Results Voy. Challenger, 24: 273 [part, excluding *Philonicus lucasii* Bate, 1881 = *Hadropenaeus lucasii*, and *Philonicus pectinatus* Bate, 1888 = *Solenocera pectinata*]. Preoccupied by *Philonicus* Loew, 1849: 144 (Diptera).

Pleoticus Bate, 1888, Rep. scient. Results Voy. Challenger, 24: xii [part]. Replacement name for *Philonicus* Bate, 1888. — PÉREZ FARFANTE, 1977a, Fish. Bull., U. S., 75(2): 295. — SQUIRES, 1990, Can. Bull. Fish. Aq. Sci., 221: 36.

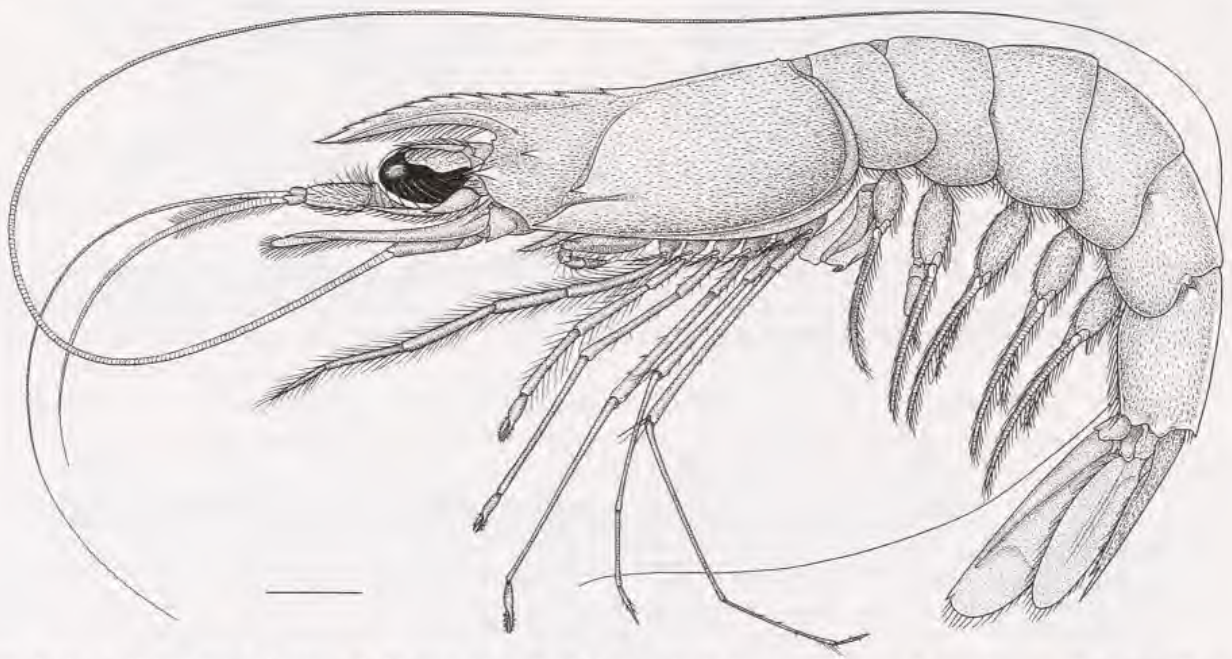

FIG. 122. — *Pleoticus robustus*, ♂ 31 mm cl, east of Peninsula Valiente, Panama. Lateral view. Scale = 10 mm. (From PÉREZ FARFANTE, 1977).

Source : MNHN, Paris

Faxonia Bouvier, 1905a, C. r. hebd. Séanc. Acad. Sci., Paris, 140: 981 [part, excluding *Faxonia diomedeae* (Faxon, 1893) = *Haliporoides diomedeae* (Faxon, 1893)]. Type species: By subsequent designation, by FOWLER, 1912, Ann. Rep. N. J. State Mus. for 1911: 543, *Penaeopsis [sic] ocularis* Faxon, 1895 [= *Pleoticus robustus* Smith, 1885b], Mem. Mus. comp. Zool. Harv., 18: 187.

Parartemesia Bouvier, 1905b, C. r. hebd. Séanc. Acad. Sci., Paris, 141: 747 [part, excluding *Parartemesia tropicalis* Bouvier, 1905b = *Mesopenaeus tropicalis* (Bouvier, 1905b)]. Type species: By subsequent designation by FOWLER, 1912, Ann. Rep. N. J. State Mus. for 1911: 543, *Parartemesia carinata* Bouvier, 1905b [= *Pleoticus muelleri* (Bate, 1888)].

Haliporus - BOUVIER, 1905b, C. r. hebd. Séanc. Acad. Sci., Paris, 141: 1 [part]. — A. MILNE EDWARDS and BOUVIER, 1909, Mem. Mus. comp. Zool. Harv., 27: 206 [part]. — DE MAN, 1911, Siboga Exped., 39a: 31. — BALSS, 1914b, Zool. Anz. Akad. Wiss. Wien, 9: 7. — CROSNIER, 1989b, Sencken. biol., 69(4/6): 380.

TYPE SPECIES: (for both *Philonicus* and *Pleoticus*), by subsequent designation by FOWLER, 1912, Ann. Rep. N. J. State Mus. for 1911: 543, *Philonicus mülleri* Bate, 1888.

TYPE LOCALITY: Off Montevideo, Uruguay, 35°02'N, 55°15'W, 24 m.

GENDER: Masculine.

DIAGNOSIS. — Body robust, integument rather thick and firm. Rostrum moderately long, reaching at least midlength of second antennular segment or at most slightly overreaching peduncle; ventral margin straight or concave; armed with dorsal teeth only; epigastric tooth and first rostral separated by interval equal to, or only slightly greater than that between first and second rostral teeth. Carapace moderately long; orbital, postorbital, antennal, and hepatic spines present; pterygostomian spine absent; branchiostegal spine present or absent. Cervical sulcus long, ending close or rather close to middorsum of carapace; hepatic carina well marked anteriorly, indistinct posteriorly; hepatic sulcus nearly horizontal posteriorly, to level of hepatic spine, from there turning anteroventrally and reaching pterygostomian region; branchiocardiac carina and sulcus present or lacking; submarginal carina sharp. Telson armed with pair of conspicuous, fixed, subapical spines.

Prosartema long or moderately so, flexible; antennular flagella similar, subcylindrical, longer than carapace. Mandibular palp triarticulate (not biarticulate as stated by PÉREZ FARFANTE, 1977a, and illustrated by BALSS, 1914), distal articles broad, distalmost as long, or almost as long as middle one, and tapering to blunt apex. Palp of first maxilla entire, narrowing distally to apex, and bearing proximal tuft of relatively long setae on lateral margin and produced into broad proximomesial and distomesial lobules. Fifth moderately to considerably longer than fourth. Basial and ischial spines on first pereopod. Exopods well developed. Lateral ramus of uropod armed with terminal distolateral spine. One or 2 rudimentary arthrobranchiae on somite VII.

Distribution of branchiae, epipods, and exopods in the genus *Pleoticus*.

Somite	VII (Mxp1)	VIII (Mxp2)	IX (Mxp3)	X (P1)	XI (P2)	XII (P3)	XIII (P4)	XIV (P5)
Pleurobranchiae	-	-	1	1	1	1	1	1
Arthrobranchiae	r	r+r	2	2	2	2	2	-
Podobranchiae	-	1	-	-	-	-	-	-
Epipods	1	1	1	1	1	1	1	-
Exopods	1	1	1	1	1	1	1	1

Petasma semi-open, with distal part of ventral costa distally free from flexible terminal part of ventrolateral lobule. Appendix masculina and appendix interna present, basis of pleopod

Source : MNHN, Paris

produced distally into elongate ventrolateral spur. Thelycum open; anterior part of sternite XIV conspicuously modified, bearing paired prominences or strong plates.

An illustrated account of the spermatophore of *P. robustus* is provided by PÉREZ FARFANTE (1977a).

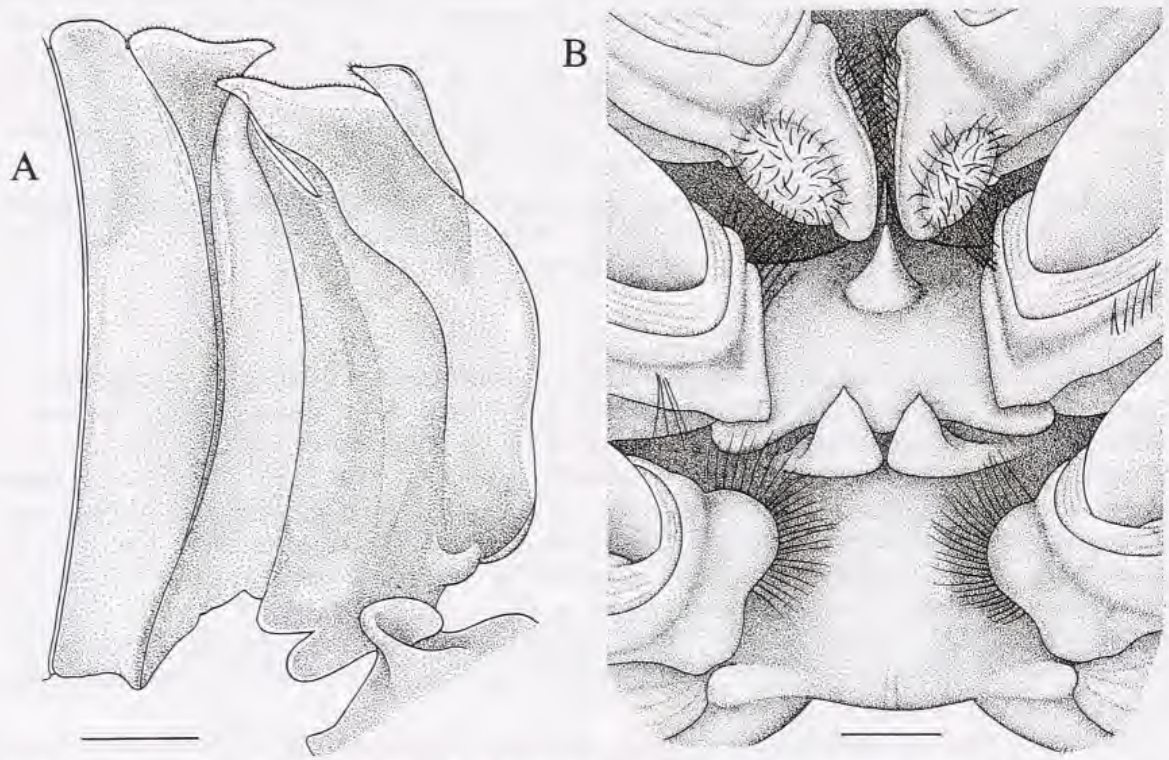

FIG. 123. — *Pleoticus robustus*: **A**, ♂ 32 mm cl, east of Península Valiente, Panama. Petasma, dorsolateral view of right half. Scale = 2 mm. (From PÉREZ FARFANTE, 1977). — **B**, ♀ 49 mm cl, south of Curaçao. Thelycum. Scale = 2 mm. (From PÉREZ FARFANTE, 1977).

SPECIES. — *Pleoticus muelleri* (Bate, 1888). Southern Brazil to southern Argentina.

Pleoticus robustus (Smith, 1885b). Western Atlantic Ocean from Massachusetts to Gulf of Mexico; Caribbean to French Guiana.

Pleoticus steindachneri (Balss, 1914b). Red Sea; Gulf of Aden.

Genus ***Solenocera*** Lucas, 1849

Figures 124-125

Penaeus - FABRICIUS, 1798, Suppl. Ent. Syst., : 408 [part].

Peneus - RISSO, 1816, Hist. Nat. Crust. Nice, : 98 [part].

Solenocera Lucas, 1849a, Rev. Mag. Zool., (2)1: 159 [nomen nudum].

Solenocera Lucas, 1849b, Rev. Mag. Zool., (2)1: 300; 1850, Annls Soc. ent. Fr., (2)8: 219. — ALCOCK, 1901, Descr. Cat. Indian Deep-Sea Crust., : 19. — BOUVIER, 1908a, Résult. Camp. scient. Prince Albert I, 33: 86. — DE MAN, 1911, Siboga Exped., 39a: 45. — BURKENROAD, 1936b, Bull. Bingham oceanogr. Coll., 5(2): 120. — KUBO, 1949, J. Tokyo Coll. Fish., 36(1): 223. — ZARIQUIEY ALVAREZ, 1968, Investnes Pesq., 32: 49.

Source : MNHN, Paris

— PÉREZ FARFANTE and BULLIS, 1973, Smithson. Contrib. Zool., 153: 2. — CROSNIER, 1978, Faune Madagascar, 46: 129. — BURKENROAD, 1983, Crust. Issues, 1: 281. — DE FREITAS, 1985, Investl. Rep. oceanogr. Res. Inst., Durban, 57: 54. — LIU and ZHONG, 1988, Pen. Shr. S. China Sea, : 84. — IVANOV, 1994, Arthrop. Sel., 3: 13.

Placed on the Official List of Generic Names in Zoology, International Commission on Zoological Nomenclature, 1961, Opinion 611, Name No. 1444, Bull. zool. Nom., 18: 306.

Philonicus - BATE, 1888, Rep. scient. Results Voy. Challenger, 24: 273 [part, excluding *Philonicus mulleri* Bate, 1888 = *Pleoticus muelleri* (Bate, 1888), and *Philonicus lucasii* Bate, 1881 = *Hadropenaeus lucasii* (Bate, 1881)].

Pleoticus - BATE, 1888, Rep. scient. Results Voy. Challenger, 24: xii [part]. Replacement name for *Philonicus* Bate.

Parasolenocera Wood-Mason, 1891, Ann. Mag. nat. Hist., (6) : 276. Type Species: By monotypy, *Parasolenocera annectens* Wood-Mason, 1891. Type locality: Andaman Sea, 11°25'5"N, 92°47'6"E, 652 m. Gender: Feminine.

Transolenocera Burkenroad, 1934b, Bull. Am. Mus. Nat. Hist., 68(2): 69.

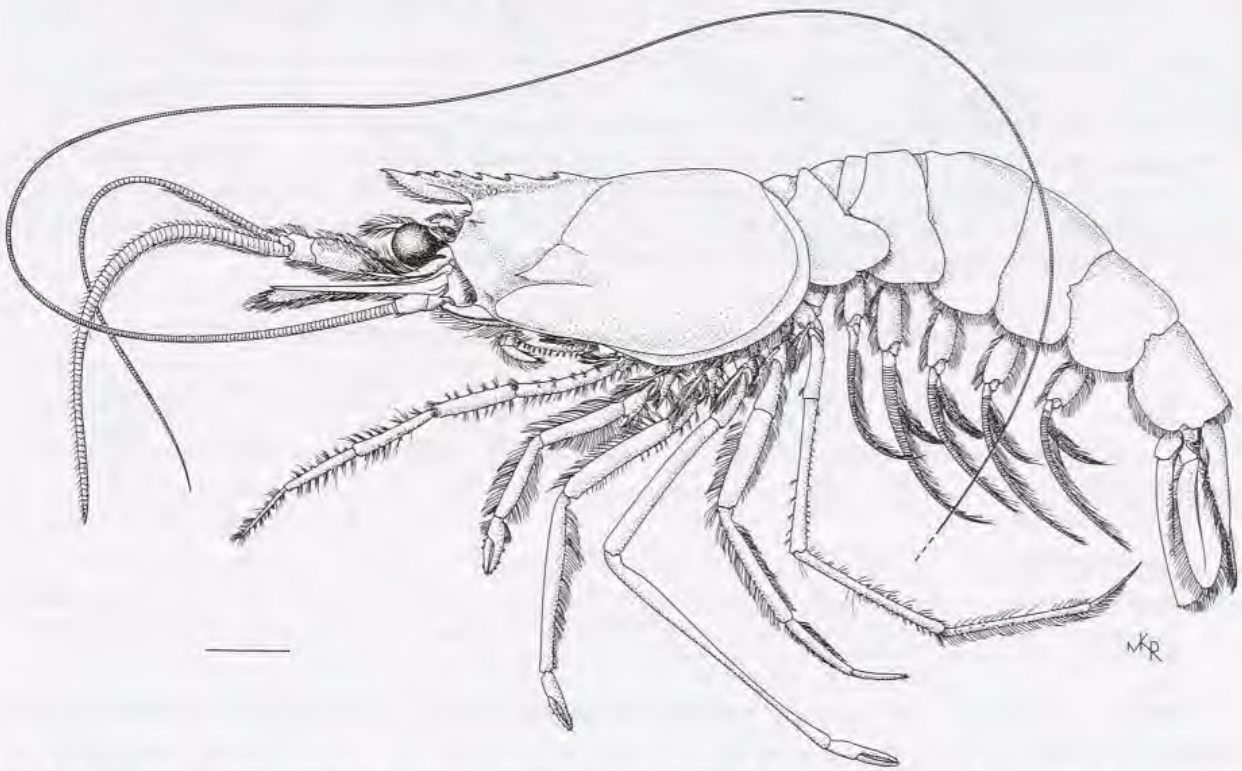

FIG. 124. — *Solenocera membranacea*, ♀ 34 mm cl, southeast Atlantic Ocean off the Congo. Lateral view. Scale = 10 mm.

TYPE SPECIES: By monotypy, *Solenocera philippii* Lucas, 1849a, [= *Penaeus siphonoceros* Philippi, 1840], [= *Penaeus membranaceus* Risso, 1816 = *Solenocera membranacea* (Risso, 1816), Ann. Soc. ent. Fr., 2: 8)].

TYPE LOCALITY: Bay of Alger near Fort Bab-Azzoun, and that of PHILIPPI's specimens; type locality not restricted.

GENDER: Feminine.

DIAGNOSIS. — Body moderately slender, integument glabrous or sparsely setose on carapace, and with dorsal patch of setae on rostrum and anterior part of carapace. Rostrum short, not overreaching second antennular segment, strongly compressed laterally, deep; armed with dorsal

Source : MNHN, Paris

teeth only; epigastric and first rostral teeth variably separated. Carapace with orbital spine present or absent; armed with postorbital, antennal and hepatic spines; postantennal spine lacking; pterygostomian or branchiostegal spines present or absent. Cervical sulcus strongly marked, long, reaching, or almost reaching, middorsum of carapace; hepatic sulcus deep, nearly horizontal posterior to level of hepatic spine, from there turning anteroventrally and reaching pterygostomian region; hepatic carina sharp anteriorly; branchiocardiac carina and sulcus present or absent; posthepatic carina absent. Telson usually with pair of fixed posterolateral spines, lacking movable spines.

Antennule with prosartema well developed, variable in length; antennular flagella longer than carapace, lamellate, broad, ventral pair forming trough covered by narrower dorsal flagellum, four together constituting respiratory siphon. Mandibular palp triarticulate, distal articles subtriangular with contiguous bases. Palp of first maxilla entire, rather abruptly narrowing to rounded apex, bearing setose proximolateral lobule (setae extending near to or beyond apical tuft) and broad, setose proximomesial and small distomesial lobules, latter armed with 1-3 long, spinous setae. Basial and ischial spines on first pereopod; ischial spine usually on second pereopod. Exopods well developed, on all maxillipeds and pereopods. Lateral ramus of uropod almost always lacking distolateral spine. Two arthrobranchiae on somite VII, both small or anterior one rudimentary, consisting of small lamella lacking filaments.

Petasma semi-open, with dorsolateral lobule usually bearing terminal process and ventral costa distally free from contiguous part of ventrolateral lobule. Appendix masculina and appendix interna present, basis of pleopod produced distally into elongate distolateral spur.Thelycum open, usually with conspicuous protuberances on anterior part of sternite XIV.

Distribution of branchiae, epipods, and exopods in the genus *Solenocera*.

Somite	VII (Mxp1)	VIII (Mxp2)	IX (Mxp3)	X (P1)	XI (P2)	XII (P3)	XIII (P4)	XIV (P5)
Pleurobranchiae	-	-	1	1	1	1	1	1
Arthrobranchiae	s or r+s	2	2	2	2	2	2	-
Podobranchiae	-	1	-	-	-	-	-	-
Epipods	1	1	1	1	1	1	1	-
Exopods	1	1	1	1	1	1	1	1

SPECIES. — *Solenocera acuminata* Pérez Farfante and Bullis, 1973. Bahamas; Caribbean Sea to French Guiana.

Solenocera africana Stebbing, 1917. Eastern Atlantic Ocean from Morocco to Agulhas Bank, South Africa; off Natal, South Africa.

Solenocera agassizii Faxon, 1893. Cabo Blanco, Costa Rica to northern Peru.

Solenocera alfonso Pérez Farfante, 1981, forma *typica* Crosnier, 1989a. Philippines.

Solenocera alfonso Pérez Farfante, 1981, forma *inermis* Crosnier, 1989a. Indonesia; Philippines.

Solenocera algoensis Barnard, 1947. East coast of Africa from Algoa Bay, South Africa, to Zanzibar; Madagascar.

Solenocera alticarinata Kubo, 1949. South China Sea; Taiwan; Hong Kong; Japan.

Solenocera annectens (Wood-Mason, 1891). Andaman Sea; Indonesia; Philippines.

Solenocera atlantidis Burkenroad, 1939. North Carolina to Florida, Gulf of Mexico; West Indies; Caribbean coast of Central and South America to Brazil.

Source : MNHN, Paris

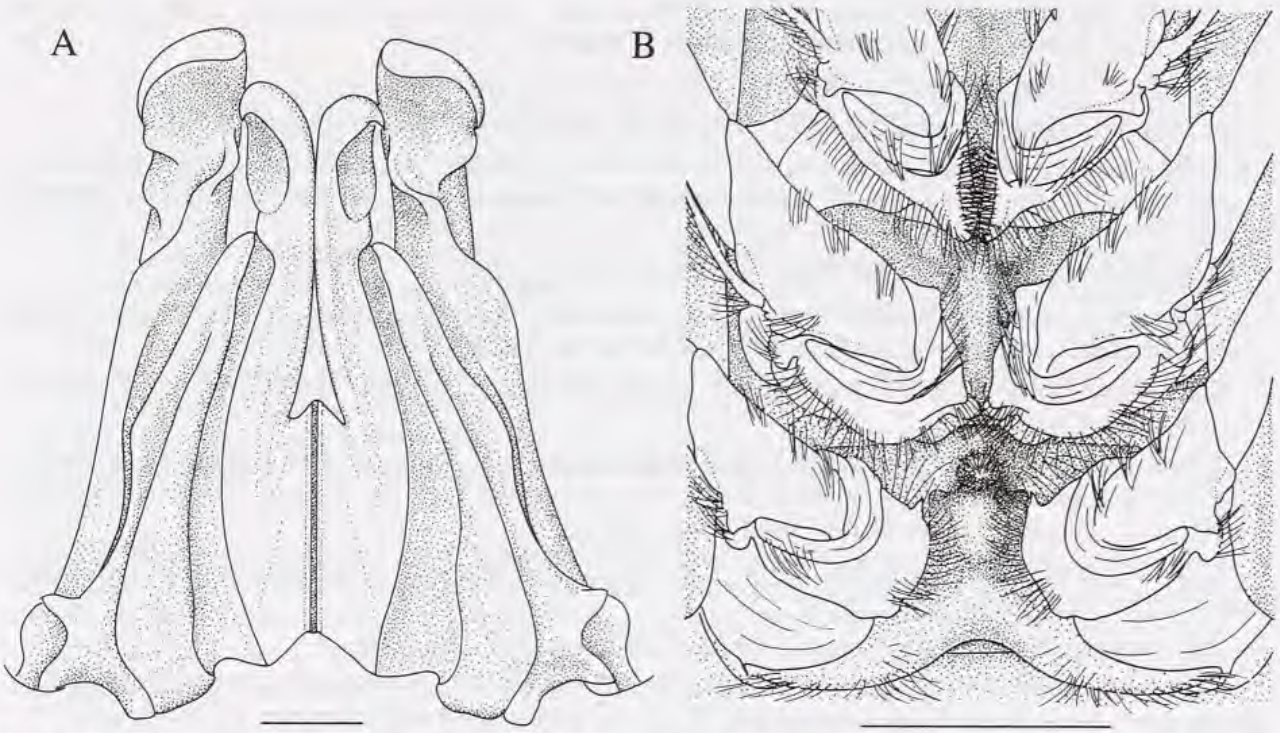

FIG. 125. — *Solenocera membranacea*: **A**, ♂ 13.5 mm cl, off Sicily, Mediterranean. Petasma, dorsal view. Scale = 1 mm. — **B**, ♀ 34 mm cl, southeast Atlantic Ocean off the Congo. Thelycum. Scale = 10 mm.

Solenocera australiana Pérez Farfante and Grey, 1980. Northern Australia.

Solenocera barunajaya Crosnier, 1994c. Indonesia; Timor Sea off Northern Australia.

Solenocera bedokensis Hall, 1962. Sri Lanka; Singapore; Gulf of Tonkin; South China Sea; Philippines; Hong Kong.

Solenocera choprai Nataraj, 1945. South-east coast of South Africa; Mozambique; Madagascar; Gulf of Suez; Red Sea; Arabian Sea; Andaman Sea; Straits of Malacca; Indonesia; South China Sea; Philippines; Taiwan; Western Australia and New South Wales, Australia.

Solenocera comata Stebbing, 1915. South West Indian Ocean off South Africa; Madagascar; Réunion; Indonesia; Philippines; South China Sea; Japan.

Solenocera crassicornis (H. Milne Edwards, 1837). Persian Gulf; Pakistan; India; Burma; Singapore; Malaysia; Gulf of Tonkin; North Borneo; South China Sea; Hong Kong; Taiwan; Japan.

Solenocera faxoni De Man, 1907. Indonesia; South China Sea; Japan; New South Wales, Australia.

Solenocera florea Burkenroad, 1938. West coast of Baja California, Gulf of California; Mexico to northern Peru.

Solenocera geijskesi Holthuis, 1959. Western Caribbean; Surinam; French Guiana; northern Brazil.

Solenocera gurjanovae Starobogatov, 1972. Gulf of Tonkin.

Solenocera halli Starobogatov, 1972. Singapore; Straits of Malacca; Gulf of Tonkin.

Solenocera hextii Wood-Mason and Alcock, 1891. Gulf of Aden; Arabian Sea; Bay of Bengal.

Source : MNHN, Paris

Solenocera koelbeli De Man, 1911. Arabian Sea; Indonesia; Philippines; Gulf of Tonkin; South China Sea; Hong Kong; Taiwan; Japan; Korea.

Solenocera mascarensis Burukovsky, 1993. Saya de Malha Bank.

Solenocera melantho De Man, 1907. Indonesia; Philippines; Taiwan; Japan; Korea.

Solenocera membranacea (Risso, 1816). North-east Atlantic Ocean from Ireland to Morocco; Azores; Mediterranean; Senegal; south-east Atlantic Ocean off Cape of Good Hope, Agulhas Bank.

Solenocera moosai Crosnier, 1985. Indonesia; Philippines.

Solenocera mutator Burkenroad, 1938. Southern California, U.S.A.; West coast of Baja California, Gulf of California, Mexico to Isla Lobos de Tierra, northern Peru.

Solenocera necopina Burkenroad, 1939. North Carolina to Florida; Gulf of Mexico; Bahamas; Caribbean to Uruguay.

Solenocera pectinata (Bate, 1888). East African coast off Tanzania and Kenya; Madagascar; Arabian Sea; Bay of Bengal; Burma; Malaysia; Indonesia; Gulf of Tonkin; South China Sea; Philippines; Taiwan; Japan; Wallis and Futuna Islands.

Solenocera pectinulata Kubo, 1949. Off Kenya; Madagascar; Mauritius; India; Indonesia; South China Sea; Philippines; Japan.

Solenocera phuongi Starobogatov, 1972. Indonesia; Gulf of Tonkin.

Solenocera rathbunae Ramadan, 1938. Gulf of Aden; Zanzibar; Madagascar; South China Sea; Philippines; New South Wales, Australia; Wallis and Futuna Islands; Hawaii.

Solenocera spinajugo Hall, 1961. Straits of Malacca; Philippines.

Solenocera vioscai Burkenroad, 1934b. North Carolina to Florida and Gulf of Mexico.

Solenocera waltairensis George and Muthu, 1970. East coast of Africa off Kenya; Madagascar; India; Sri Lanka; Philippines.

Solenocera zarenkovi Starobogatov, 1972. Gulf of Tonkin.

Superfamily SERGESTOIDEA Dana, 1852

Sergestoidea Dana, 1852a, Proc. Acad. nat. Sci. Philad., 6: 18 [as Sergestidae, name translated to superfamilial status by HOLTHUIS in GLAESSNER, 1969, Treatise Invert. Paleo., R. Arthropoda 4(2): R446, R450]. — BURKENROAD, 1983, Crust. Issues, 1: 280, 281, 284. — WILLIAMS, 1984, Shr. Lob. Crabs Atl. Coast U.S., : 50.

DIAGNOSIS. — Carapace moderately to extremely compressed. Rostrum shorter than eyestalk. Antennule with ventral flagellum modified or absent. Pereopods 4 and 5 reduced or absent (except in *Sicyonella*). Pleurobranchia absent. Never more than 2 branchiae per thoracic somite on each side. No more than 7 or 8 well developed branchiae on each side.

Key to the Families of the Superfamily SERGESTOIDEA

— Branchiae absent; body strongly compresssed ..... LUCIFERIDAE

— Branchiae present; body moderately compressed ..... SERGESTIDAE

Source : MNHN, Paris

Family LUCIFERIDAE De Haan, 1849

Luciferidae De Haan, 1849, Fauna Jap., Crust., : 242. — Dana, 1850, Am. J. Sci. Arts, (2)9: 5; 1852, U. S. Expl. Exped., 13(1): 639; 1853, Class. Geog. Distrib. Crust., : 1435. — Crosnier and Forest, 1973, Faune Trop., 19: 345. — Burkenroad, 1983, Crust. Issues, 1: 281, 283. — Williams, 1984, Shr. Lob. Crabs Atl. Coast U.S., : 52. — Squires, 1990, Can. Bull. Fish. Aq. Sci., 221: 57.
Placed on the Official List of Family-Group Names in Zoology, International Commission on Zoological Nomenclature, 1969, Opinion 864, Bull. zool. Nom., 25(4/5): 141. [In the Official List, the author of the name Luciferidae is incorrectly given as Dana, 1850. The correct author of Luciferidae is De Haan, 1849].

Luciferinae - Bate, 1888, Rep. scient. Res. Voy. Challenger, 24: 443. — Ortmann, 1893, Ergebn. Plankton-Exped. Humboldt-Stift., 2: 29. — Hansen, 1922, Résult. Camp. scient. Prince Albert I, 64: 10, 198. — Cecchini, 1933, Mem. R. Com. Talas. Ital., 200: 12. — Burkenroad, 1934b, Bull. Am. Mus. nat. Hist., 68: 132. — Gordon, 1956, Scient. Rep. Gt. Barrier Reef Exped., 6(5): 324.

Leuciferinae - Ortmann, 1898, Bronn's Kl. Ordn. Tierreichs, (5)2: 1121.

Leuciferidae - Barnard, 1950, Ann. Mag. nat. Hist., 38: 580, 644. — Balss, 1957, Bronn's Kl. Ordn. Tierreichs, 5(1)7(12): 1521.

Diagnosis. — Rostrum short, acute. Carapace extremely laterally compressed, anteriorly elongate, with mandibles widely separated from antennae and eyes. Sixth abdominal somite in male bearing 2 ventral processes. Telson in male with strong protuberance on ventral surface.

Antennules lacking ventral flagellum in both sexes. Mandible lacking palp. Maxillae lacking palp; with exopod in form of small plate. First maxilliped lacking epipod and exopod. Second maxilliped lacking epipod. Chelae lacking, or imperfect chela having no fixed finger present only on third pereopod. Fourth and fifth pereopods absent. Branchiae absent. Genital aperture single in both sexes.

Petasma sessile, attached proximally to first pleopodal peduncle. Second pleopod in male with unilamellate appendix masculina.

Genus ***Lucifer*** Thompson, 1829

Figures 126-127

Lucifer Thompson, 1829, Zool. Res., 3: 58, pl. 7, fig. 2. — Dana, 1850, Am. J. Sci. Arts, (2)9: 5. — Bate, 1888, Rep. scient. Results Voy. Challenger, 24: 443. — Hansen, 1919, Siboga Exped., 38: 48; 1922, Résult. Camp. scient. Prince Albert I, 54: 198. — Bowman and Holthuis, 1968, Crustaceana, 14(2): 216. — Omori, 1977, Proc. Symp. Warm Water Zoopl. Spl. Publ. UNESCO/NIO, 1977: 2. — Burkenroad, 1983, Crust. Issues, 1: 283. — Squires, 1990, Can. Bull. Fish. Aq. Sci., 221: 57.
Placed on Official List of Generic Names in Zoology, International Commission on Zoological Nomenclature, 1969, Opinion 864, Name No. 1817, Bull. zool. Nom., 25(4/5): 139.

Leucifer H. Milne Edwards, 1837, Hist. Nat. Crust., : 467. — Ortmann, 1898, Bronn's Kl. Ordn. Tierreichs, (5)2: 1122. [Dr. L. Holthuis (in litt., 1996) notes that the name *Leucifer* H. Milne Edwards is an incorrect subsequent spelling of *Lucifer*, and is not an emendation, as nowhere in Milne Edwards' publication is the spelling *Lucifer* cited, and no choice between the two names is mentioned. *Leucifer* therefore has no standing and is unavailable.]

Type Species: By subsequent indication under Article 68b, International Code of Zoological Nomenclature, 3rd ed., by H. Milne Edwards, 1837, *Leucifer typus* H. Milne Edwards, 1837, Hist. Nat. Crust., : 469.

Type Locality: Atlantic Ocean.

Gender: Masculine.

Source : MNHN, Paris

FIG. 126. — *Lucifer typus*, ♂, off North Carolina, lateral view. Scale = 10 mm.

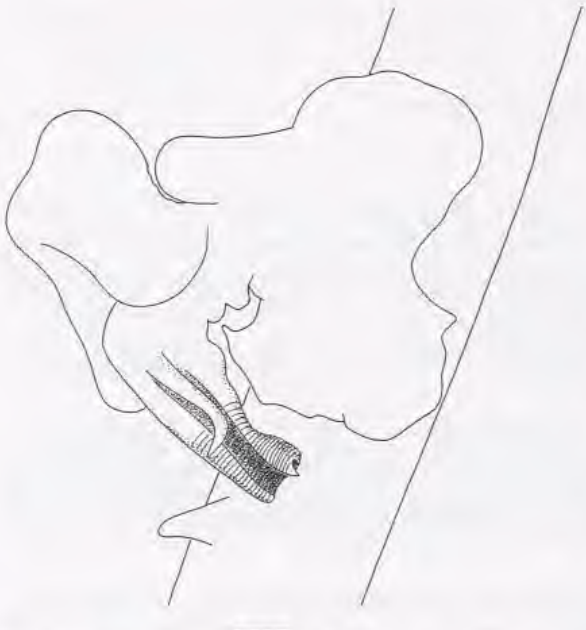

FIG. 127. — *Lucifer typus*, ♂, north-east Atlantic Ocean off Liberia. Petasma. Scale = 2 mm.

DIAGNOSIS. — As for Family.

REMARKS. — The position and relationships of the Luciferidae are problematic, as was pointed out by BURKENROAD (1983: 284). Although the latter included the group in the Dendrobranchiata, they possess none of the features that he used to characterize this suborder, other than that they hatch as free nauplii (generally agreed to be a primitive feature; see KAESTNER, 1970: 53). Traditionally regarded as a subgroup of the Sergestoidea, the placement of *Lucifer* within the Penaeidea was based on the presence of a petasma in the male (a feature also found in the eumalacostracan order Euphausiacea), while the absence of pereopods 4 and 5 was seen as indicating its relationship to the sergestids: *Acetes*, for example, also lacks pereopods 4 and 5. The assumption implicit here is that loss of pereopods 4 and 5 is a synapomorphic feature of the Luciferidae and the Sergestidae, rather than two events that occurred independently. However, the advanced features that characterize the Luciferidae, namely the extreme compression of the body, the lack of chelae, the absence of a

Source : MNHN, Paris

ventral antennular flagellum, the absence of mandibular and maxillar palps, the retension of eggs on the third pleopods of the female, and the absence of gills, suggest that loss of the two posterior pereopods was part of the suite of extreme modifications for a highly specialized planktonic existence. Further, the complete lack of gills in *Lucifer* negates the most basic feature for inclusion in the Dendrobranchiata.

SPECIES. — *Lucifer chacei* Bowman, 1967. East coast of South Africa; Madagascar; Indonesia to Hawaii; Tahiti.

Lucifer faxoni Borradaile, 1915. Western Atlantic Ocean from Long Island Sound to Rio de Janeiro; Gulf of Mexico; Caribbean Sea; Bermuda; eastern Atlantic Ocean off Senegal and Congo.

Lucifer hanseni Nobili, 1905. Madagascar; Red Sea; India; South China Sea; Victoria, Australia.

Lucifer intermedius Hansen, 1919. Gulf of Oman; Indonesia; Malacca Straits to Japan.

Lucifer orientalis Hansen, 1919. East coast of South Africa; Red Sea; Indonesia; Malaysia to South China Sea; Philippines; eastern Central Pacific Ocean.

Lucifer penicillifer Hansen, 1919. South-east coast of South Africa; east African coast; Bay of Bengal; Malaysia; Indonesia; South China Sea; Philippines; Hong Kong; Japan; northern Australia.

Lucifer typus H. Milne Edwards, 1837. North-east Pacific Ocean, off Baja California and Gulf of California to north of 4 N; off New Foundland; North-west Atlantic Ocean off U.S.A.; Sargasso Sea; Brazil; north-east Atlantic Ocean; Mediterranean; south-east Atlantic Ocean off Cape of Good Hope; east coast of South Africa; Bay of Bengal; Philippines; Queensland, Australia; eastern Central Pacific Ocean.

Family SERGESTIDAE Dana, 1852

Sergestidae Dana, 1852a, Proc. Acad. nat. Sci. Philad., 6: 18; 1852b, Am. J. Sci. Arts, (2)14: 123; 1853, Class. Geog. Distrib. Crust., : 1434. — BATE, 1888, Rep. scient. Results Voy. Challenger, 24: 345. — ORTMANN, 1898, Bronn's Kl. Ordn. Tierreichs, (5)2: 1121. — ALCOCK, 1901, Descr. Cat. Indian Deep-Sea Crust., : 47. — SENNA, 1903, Boll. Soc. ent. ital., 34: 280. — HANSEN, 1922, Résult. Camp. scient. Prince Albert I, 64: 9. — CECCHINI, 1933, Mems. R. Com. Talas. Ital., 200: 4. — BARNARD, 1950, Ann. S. Afr. Mus., 38: 637. — BALSS, 1957, Bronn's Kl. Ordn. Tierreichs, 5(1)7(12): 1520. — CROSNIER and FOREST, 1973, Faune Trop., 19: 305. — OMORI, 1975, Bull. Oc. Res. Inst. Univ. Tokyo, 7: 5. — WILLIAMS, 1984, Shr. Lob. Crabs Atl. Coast U.S., 50. — BAUER, 1986, J. Crust. Biol., 6(3): 318. — SQUIRES, 1990, Can. Bull. Fish. Aq. Sci., 221: 46. Placed on the Official List of Family-Group Names in Zoology, International Commission on Zoological Nomenclature, 1969, Opinion 864, Bull. zool. Nom., 25(4/5): 141.

Sergestinae - BATE, 1888, Rep. scient. Results Voy. Challenger, 24: 345. — ORTMANN, 1893, Ergebn. Plankton-Exped. Humboldt-Stif., 2: 29; 1898, Bronn's Kl. Ordn. Tierreichs, (5)2: 1121. — HANSEN, 1922, Résult. Camp. scient. Prince Albert I, 64: 10. — BALSS, 1957, Bronn's Kl. Ordn. Tierreichs, 5(1)7(12): 1520.

DIAGNOSIS. — Integument thin, often very soft, bearing photophores in two genera. Rostrum shorter than eyestalks, often small to rudimentary. Carapace moderately compressed; supraorbital spine and hepatic spine present in some species of some genera; antennal, branchiostegal, and pterygostomian spines absent; cervical sulcus well marked, weak, or absent. First to fifth abdominal somites dorsally rounded, sixth somite weakly carinate. Telson with no more than 3 pairs, or lacking lateral movable spines.

Source : MNHN, Paris

Ventral antennular flagellum modified in male to form clasping organ. Antennal flagellum bipartite, consisting of stiff proximal portion and more flexible distal portion. Mandibular palp of 3 articles. First maxilliped with exopod and epipod; second maxilliped with epipod; second and third maxillipeds and all pereopods lacking exopods. First to third pereopods (in *Peisos*) or second and third pereopods with minute chela (*Sergestes pectinatus* lacking chela on third pereopod). Fourth and fifth pereopods reduced (except in *Sicyonella*) or absent. Branchiae present.

Petasma variously composed of lobus accessorius, lobus armatus, lobus connectens, lobus inermis, lobus terminalis, processus ventralis, processus uncifer; lobes often bearing hooks. Appendix masculina unilamellate. Thelycum with sternite XII and sometimes sternite XIII and coxae of third pereopod modified; seminal receptacles present, small, varying from simple shallow pockets to sac-like invaginations situated submesially at base of third pereopods.

REMARKS. — Of all the sergestid genera, *Sergestes* H. Milne Edwards, 1830, has had the most checkered history. STIMPSON (1860) applied the name *Sergia* to a late mastigopus sergestid larva, and even though ORTMANN (1893) recognized *Sergia* as a full genus, this was not generally accepted. Even YALDWYN's landmark 1957 paper on New Zealand sergestids, while recognizing a fundamental difference between those species possessing organs of Pesta (*Sergestes*) and those with dermal photophores (*Sergia*), gave these taxa subgeneric status within *Sergestes*. OMORI (1974) finally reintroduced *Sergia* as a full genus. It has long been recognized that both genera can be divided into groups of closely-related species (e.g. YALDWYN, 1957; JUDKINS, 1978), but apart from the unpublished work of JUDKINS' (1972), this division has never been formally proposed. Unfortunately, as the latter work does not constitute a publication under articles 8 and 9 of the International Code of Zoological Nomenclature (1985), the seven new genera proposed therein (and based primarily on petasmatal features) cannot be used. FOXTON (1972) demonstrated several groupings of species of *Sergestes* s.l. based on the structure and arrangement of the organs of Pesta, but, again, no formal names for these groupings were proposed.

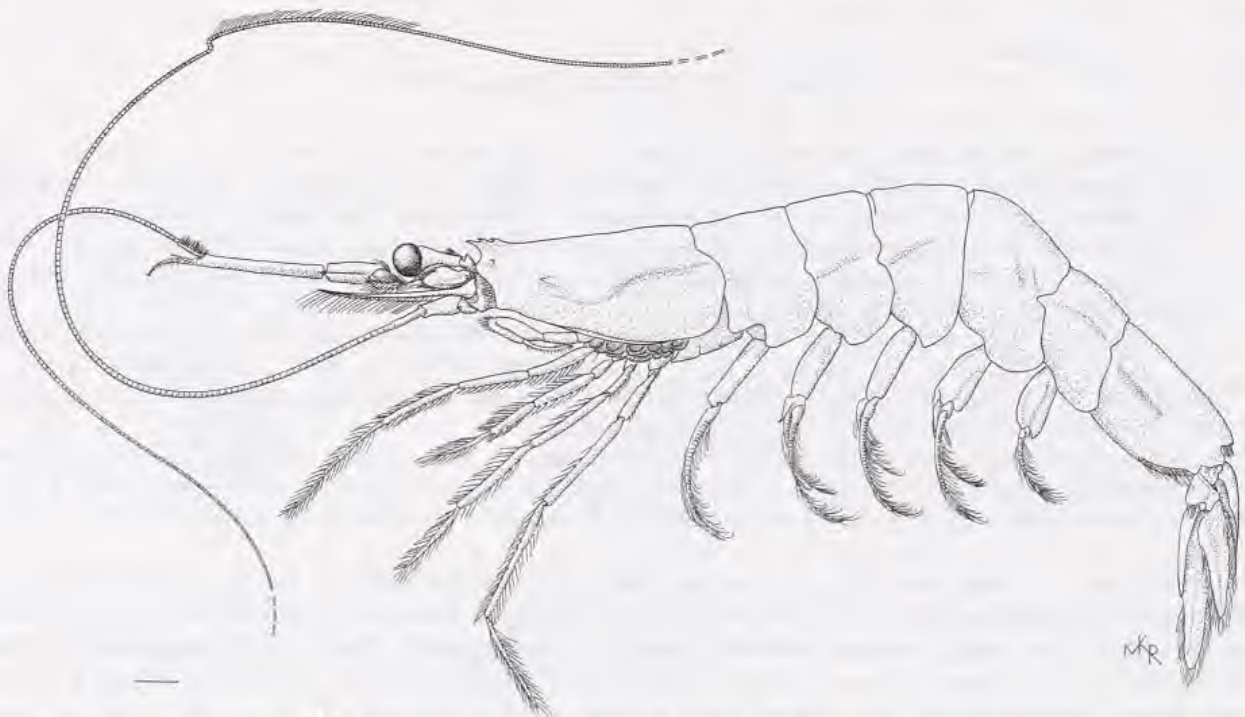

FIG. 128. — *Acetes indicus*, ♂ 4.8 mm cl, Chao Praya River at Pak Nam, Thailand. Lateral view. Scale = 1 mm.

Source : MNHN, Paris

Key to the genera of the family SERGESTIDAE

1. Fourth and fifth pereopods absent ..... ***Acetes***
— Fourth pereopod present, fifth pereopod present or absent **2**

2. Fourth pereopod of 7 podomeres ..... ***Sicyonella***
— Fourth pereopod of fewer than 7 podomeres **3**

3. Fourth pereopod of 5 podomeres; fifth pereopod vestigial in male, of 3 segments in female ..... ***Peisos***
— Fourth and fifth pereopods of 6 podomeres **4**

4. Branchiae absent or rudimentary above fourth pereopod ..... ***Petalidium***
— Branchiae present above fourth pereopod **5**

5. Dermal photophores present, organ of Pesta absent; ischiopodite of first and second pereopods lacking subterminal spine ..... ***Sergia***
— Dermal photophores absent, organ of Pesta present; ischiopodite of first and second pereopods with well developed subterminal spine .. ***Sergestes***

Genus *Acetes* H. Milne Edwards, 1830

Figures 128-130

Acetes H. Milne Edwards, 1830, Annls Sci. nat., 19: 350. — Bate, 1881, Ann. Mag. nat. Hist., (5)8: 172, 195. — Ortmann, 1893, Ergebn. Plankton-Exped. Humboldt-Stift., 2: 38; 1898, Bronn's Kl. Ordn. Tierreichs, (5)2: 1122. — Hansen, 1919, Siboga Exped., 38: 31. — Burkenroad, 1934b, Bull. Am. Mus. nat. Hist., 68: 126. — Colefax, 1940, Rec. Austr. Mus., 20(5): 341. — Barnard, 1950, Ann. S. Afr. Mus., 38: 822. — Kensley, 1971a, Ann. S. Afr. Mus., 57(10): 226. — Omori, 1975, Bull. Ocean Res. Inst. Univ. Tokyo, 7: 5; 1977, Proc. Symp. Warm Water Zoopl. Spl. Publ. UNESCO/NIO, : 4. — Burkenroad, 1983, Crust. Issues, 1: 283. — Xiao and Greenwood, 1993, Oceanogr. Mar. Biol. Annu. Rev., 31: 259-444.
Sergestes - Krøyer, 1859, K. Dansk. Vidensk. Selsk. Skr., (5)4: 268 [part].

Type Species: By original designation *Acetes indicus* H. Milne Edwards, 1830, Annls Sci. nat., 19: 351, pl. 1, 2.

Type Locality: Ganges River.

Gender: Masculine.

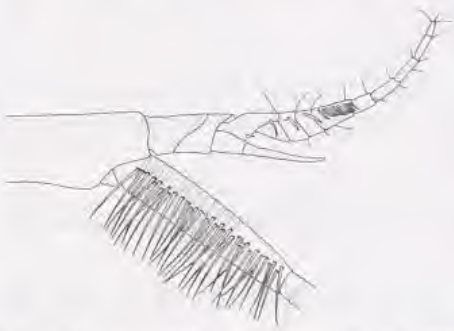

Fig. 129. — *Acetes indicus*, ♂ 4.8 mm cl, Chao Praya River at Pak Nam, Thailand. Antennule.

Diagnosis. — Rostrum short, acute, lacking, or with 1-2 dorsal teeth. Carapace with supraorbital and hepatic spines present; almost devoid of sulci. Abdominal somites dorsally rounded. Telson lacking lateral movable spines, tapering to subacute apex, tip bearing or lacking minute spines.

Ventral antennular flagellum in male modified, short, having one or more strong basal spines, flagellar portion of few articles; dorsal flagellum elongate, slender, terete. First maxilla lacking palp; second maxilla with single lobe. First maxilliped lacking palp. First to third pereopods each with minute chela. Fourth and fifth pereopods absent; fifth pereopod in male represented by

Source : MNHN, Paris

coxal protuberances.

Petasma with processus ventralis of varying length, triangular, apically acute; capitulum bearing hooks; processus uncifer broad. Thelycum with subspherical thin-walled seminal receptacles opening submedially between bases of third pereopods; coxa of third pereopod with mesially directed flange.

Distribution of branchiae, epipods, and exopods in the genus *Acetes*.

Somite	VII (Mxp1)	VIII (Mxp2)	IX (Mxp3)	X (P1)	XI (P2)	XII (P3)	XIII (P4)	XIV (P5)
Pleurobranchiae	-	-	-	-	-	-	-	-
Arthrobranchiae	-	r (-)	1	1	1	1	1	-
Podobranchiae	-	r (-)	-	-	-	-	-	-
Epipods	1	1	-	-	-	-	-	-
Exopods	1	-	-	-	-	-	-	-

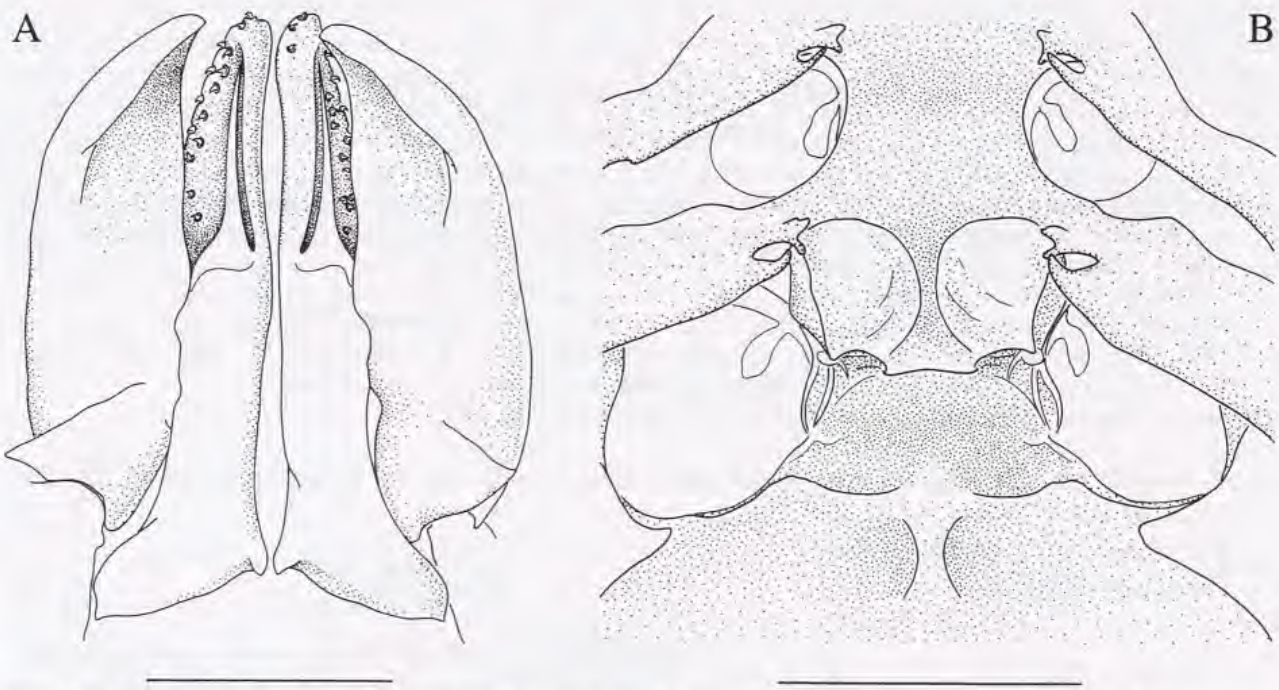

FIG. 130. — *Acetes indicus*: **A**, ♂ 4.8 mm cl, Chao Praya River at Pak Nam, Thailand. Petasma, dorsal view. Scale = 0.5 mm. — **B**, ♀ 6.0 mm cl, Chao Praya River at Pak Nam, Thailand. Seminal receptacles, dorsal view. Scale = 1 mm.

SPECIES. — *Acetes americanus americanus* Ortmann, 1893. Puerto Rico; Panama; Surinam; French Guiana; Brazil (Amazon estuary).

Acetes americanus carolinae Hansen, 1933. North Carolina; Florida to Gulf of Mexico; Panama; Surinam; French Guiana.

Acetes binghami Burkenroad, 1934b. Pacific Panama to Gulf of Guayaquil, Ecuador.

Acetes chinensis Hansen, 1919. Japan; China; Korea.

Source : MNHN, Paris

Acetes erythraeus Nobili, 1905. East coast of South Africa to Red Sea; Madagascar; Indo-West Pacific Ocean to Hong Kong and Philippines; northern Australia.

Acetes indicus H. Milne Edwards, 1830. India; Indonesia to South China Sea.

Acetes intermedius Omori, 1975. Indonesia; Philippines; Taiwan.

Acetes japonicus Kishinouye, 1905. India to Japan; Straits of Malacca; Java, Indonesia; China; Korea.

Acetes johni Nataraj, 1947. Southern India.

Acetes marinus Omori, 1975. Surinam; Brazil (brackish water).

Acetes natalensis Barnard, 1955. Natal, South Africa.

Acetes paraguayensis Hansen, 1919. Amazon River basin; Parana River basin; Paraguay River basin.

Acetes serrulatus (Krøyer, 1855). Singapore; Java, Indonesia; Sarawak.

Acetes sibogae australis Colefax, 1940. East coast of Australia.

Acetes sibogae sibogae Hansen, 1919. South India; Straits of Malacca; Singapore; Java; Borneo; Thailand; Philippines.

Acetes sibogae sibogalis Achuthankutty and George, 1973. Cochin, India.

Acetes vulgaris Hansen, 1919. Singapore; Java, Indonesia; Flores Sea; Thailand to South China Sea.

Genus ***Peisos*** Burkenroad, 1945

Figures 131-133

Peisos Burkenroad, 1945, Trans. Conn. Acad. Arts Aci., 36: 553. — Mallo and Boschi, 1982, Physis, B. Aires, A41(100): 85. — Burkenroad, 1983, Crust. Issues, 1: 283.

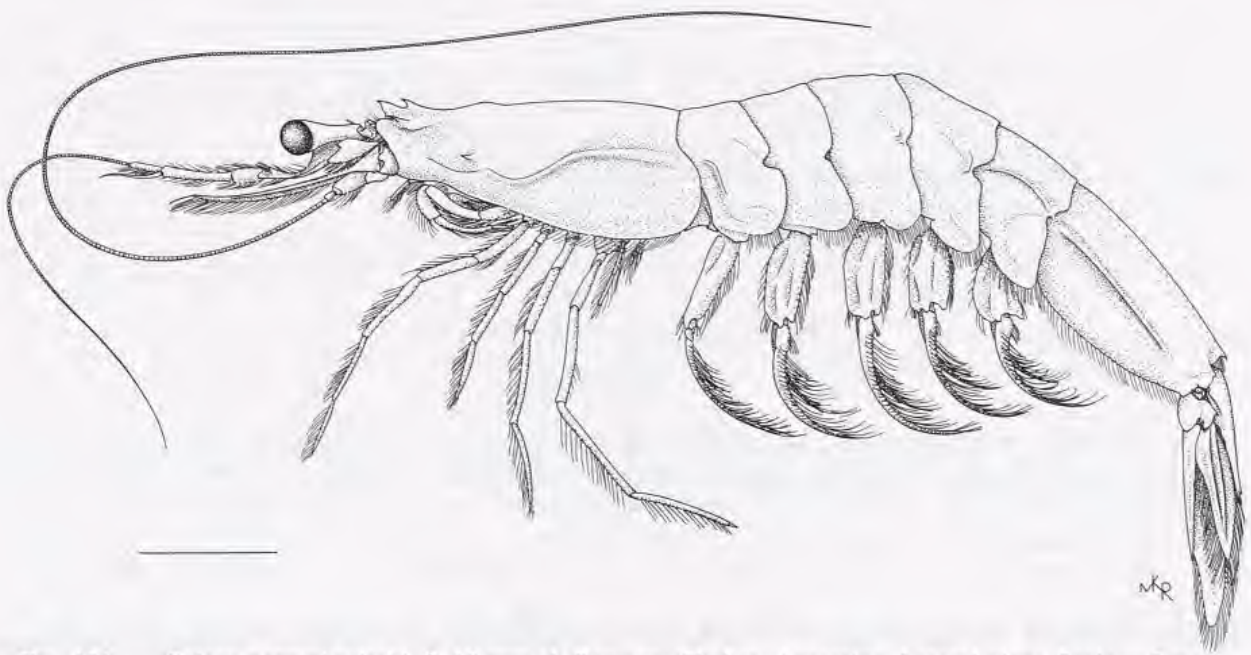

Fig. 131. — *Peisos petrunkevitchi*, ♀ 10 mm cl, Rawson, Chubut, Argentina. Lateral view. Scale = 5 mm.

Source : MNHN, Paris

TYPE SPECIES: By original designation, *Peisos petrunkevitchi* Burkenroad, 1945, Trans. Conn. Acad. Arts Sci., 36: 554.

TYPE LOCALITY: Montevideo, Uruguay, 9-11 m.

GENDER: Masculine.

DIAGNOSIS. — Rostrum short, triangular, anterodorsally directed and followed by single postrostral tooth. Carapace with strong supraorbital and hepatic spines; cervical sulcus feeble, only laterally visible; branchiocardiac carina well marked. Sixth abdominal somite weakly carinate, bearing small middorsal spine on posterior margin. Telson lacking lateral movable spines, posteriorly trispinose.

Ventral antennular flagellum of male S-shaped, lacking basal spines, with 4 short spines on segment 4. Maxilla with narrow blade-like palp. First to third pereopods each with small chela; fourth and fifth pereopods reduced; fifth pereopod about one-sixth length of fourth pereopod.

Distribution of branchiae, epipods, and exopods in the genus *Peisos*.

Somite	VII (Mxp1)	VIII (Mxp2)	IX (Mxp3)	X (P1)	XI (P2)	XII (P3)	XIII (P4)	XIV (P5)
Pleurobranchiae	-	-	-	-	-	-	-	-
Arthrobranchiae	-	r	1	1	1	1	1	-
Podobranchiae	-	r	-	-	-	-	-	-
Epipods	1	1	-	-	-	-	-	-
Exopods	1	-	-	-	-	-	-	-

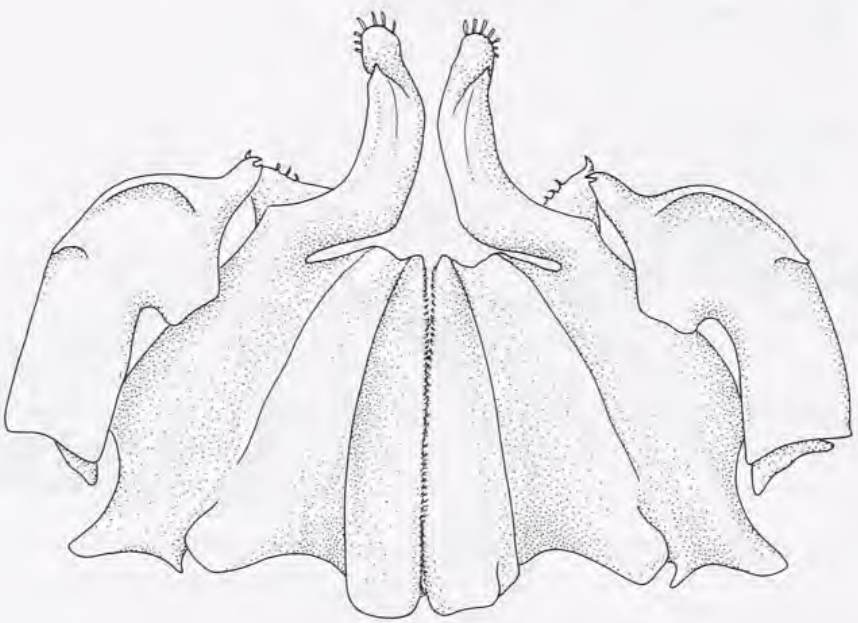

FIG. 132. — *Peisos petrunkevitchi*, ♂ 11.2 mm cl, Rawson, Chubut, Argentina. Petasma, dorsal view. Scale = 1 mm.

Source : MNHN, Paris

Petasma with processus ventralis elongate narrow, C-shaped, rounded apex directed laterally, armed with 6 claws; dorsodistal lobe at base of processus ventralis triangular, directed laterally, bearing terminal spine and smaller subterminal spines. Thelycum consisting of curved transverse plate on sternite XII having lateral depression to accommodate coxal process of third pereopod; saclike seminal receptacles opening mesially at base of third pereopod, consisting of small rounded anteromesial lobe and more elongate posterior lobe.

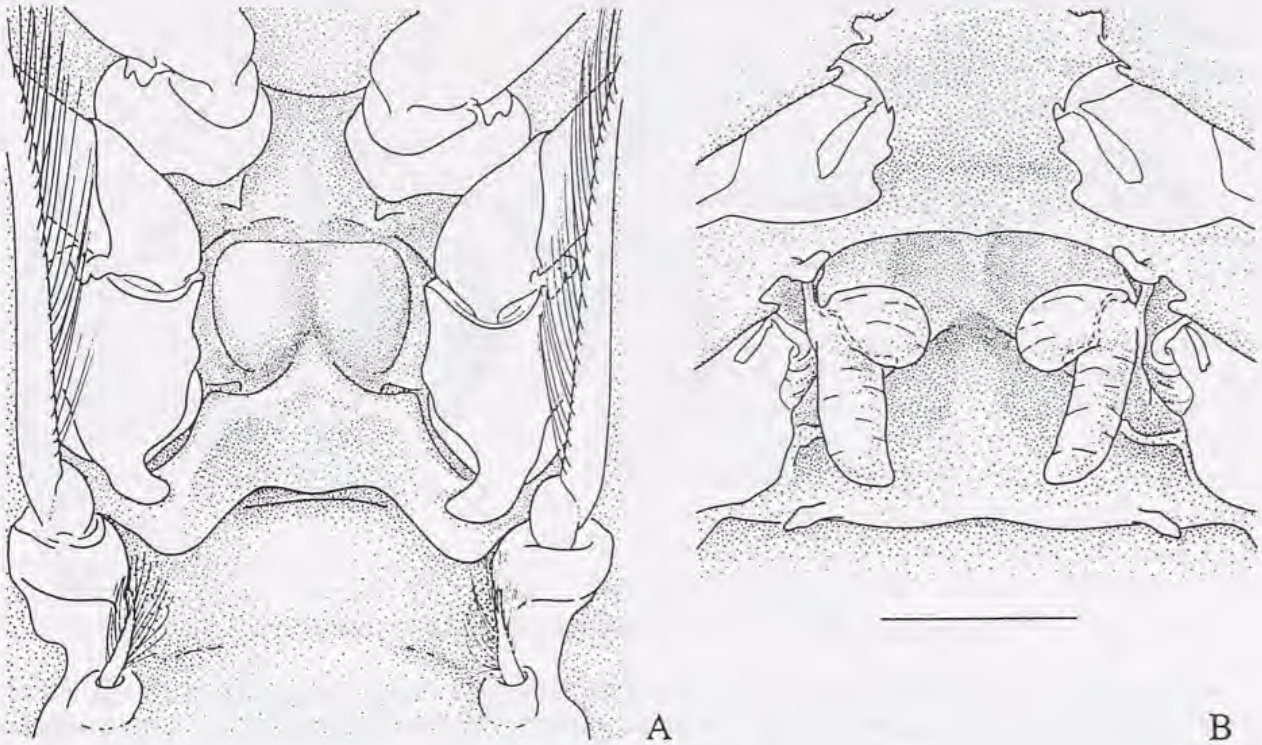

FIG. 133. — *Peisos petrunkevitchi*:, ♀ 10 mm cl, Rawson, Chubut, Argentina: **A**, Sternites XI-XIV. **B**, Seminal receptacles, dorsal view. Scales = 1 mm.

SPECIES. — *Peisos petrunkevitchi* Burkenroad, 1945. Rio Grande, Brazil, to Chubut, Argentina.

Genus ***Petalidium*** Bate, 1881
Figures 134-136

Sergestes - KRØYER, 1855, Overs. K. Dansk. Vidensk. Selsk. Forh. Copenhagen, 1855: 31, 34 [part].
Petalidium Bate, 1881, Ann. Mag. nat. Hist., (5)8: 172, 194. — ORTMANN, 1898, Bronn's Kl. Ordn. Tierreichs, (5)2: 1122. — HANSEN, 1903, Proc. zool. Soc. Lond., 1903(1): 54; 1922, Résult. Camp. scient. Prince Albert I, 54: 189. — BURKENROAD, 1937a, Zoologica, N. Y., 22(25): 324. — KENSLEY, 1971b, Ann. S. Afr. Mus., 57(10): 228. — WASMER, 1974, Crustaceana, 27(2): 159. — BURKENROAD, 1983, Crust. Issues, 1: 283.

TYPE SPECIES: By monotypy, *Petalidium foliaceum* Bate, 1881, Ann. Mag. nat. Hist., (5)8: 194.

Source : MNHN, Paris

TYPE LOCALITY: Off Marion Island, 46°46'S, 45°31'E, 2516 m; South of Australia, 47°25'S, 130°22'E, 3935 m.

GENDER: Masculine.

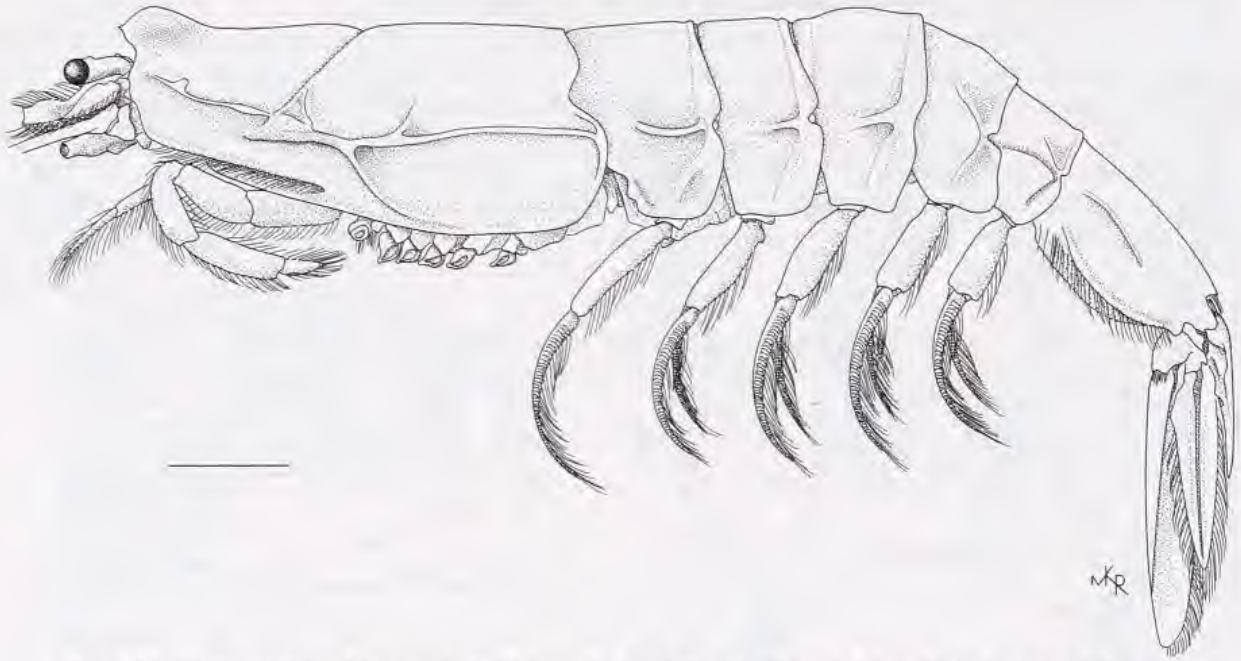

FIG. 134. — *Petalidium foliaceum*, ♀ 18 mm cl, South Pacific Ocean. Lateral view. Scale = 5 mm.

DIAGNOSIS. — Integument fairly soft and thin. Rostrum short, triangular, with one small dorsal tooth, latter sometimes lacking. Carapace with supraorbital spine absent; minute hepatic spine present, or with low hepatic prominence; cervical sulcus reaching midline, demarked laterally by distinct carina; postantennal and branchiocardiac carinae present; hepatic carina short, directed anteroventrally; anterior branchiostegal carina setose. Abdominal somites dorsally rounded. Telson lacking lateral movable spines, posterior margin trispinose with posterolateral spines much smaller than median spine, or lacking posterolateral spines.

Eye pigmented; eyestalk reaching anteriorly well beyond rostral apex, with small mesiodistal tubercle. Ventral antennular flagellum in male with segment 3 of peduncle elongate, tipped with spine, segment 4 concave, with distal protuberance; short spines on inner surface of segments 3 and 4; flagellum of 5 slender articles. First to third pereopods slender, elongate, second and third

Distribution of branchiae, epipods, and exopods in the genus *Petalidium*.

Somite	VII (Mxp1)	VIII (Mxp2)	IX (Mxp3)	X (P1)	XI (P2)	XII (P3)	XIII (P4)	XIV (P5)
Pleurobranchiae	-	-	-	-	-	-	-	-
Arthrobranchiae	-	lam	1+lam	1+lam	1+lam	1+lam	s+r	-
Podobranchiae	-	r	-	-	-	-	-	-
Epipods	1	-	-	-	-	-	-	-
Exopods	1	-	-	-	-	-	-	-

Source : MNHN, Paris

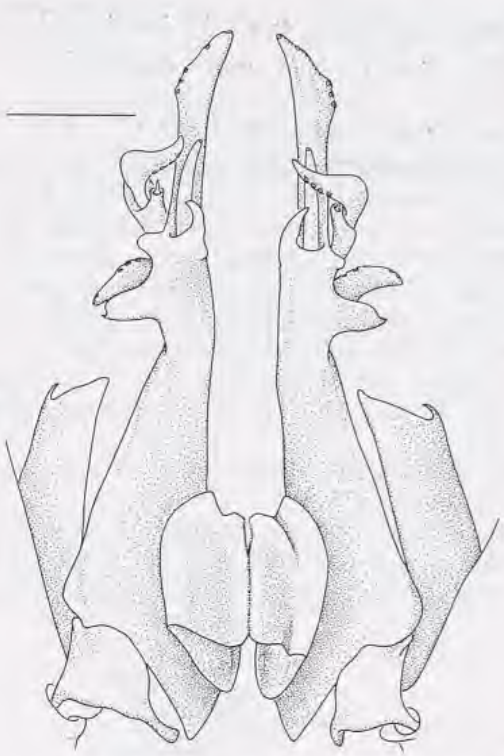

FIG. 135. — *Petalidium foliaceum*, ♂ 13 mm cl, Antarctic Ocean. Petasma, dorsal view. Scale = 1 mm.

pereopods with minute chela; fourth and fifth pereopods reduced, fourth longer than fifth. Branchial lamellae as well as branchiae present; branchiae sometimes having fewer branches than in *Sergestes*.

Petasma with processus ventralis bifurcate; lobus armatus bilobed; lobus terminalis bifurcate, slender; lobus inermis short; pars externa with small oblique tooth distally. Thelycum barely differentiated, with shallow seminal receptacles situated laterally beneath rounded lateral flap at base of third pereopod.

SPECIES. — *Petalidium foliaceum* Bate, 1881. South-east Atlantic Ocean off Cape of Good Hope, South Africa; south-west Indian Ocean off Natal, South Africa; southern oceans to Antarctica.

Petalidium obesum (Krøyer, 1855). North-east Atlantic Ocean off Azores, Canary Islands, Cape Verde Islands; south-east Atlantic Ocean off Namibia and Cape of Good Hope, South Africa; south-west Indian Ocean off Natal, South Africa.

Petalidium suspiriosum Burkenroad, 1937a. North-east Pacific Ocean off Oregon, and Baja California to Isla Clarion, Mexico; Hawaii; north-west Pacific Ocean.

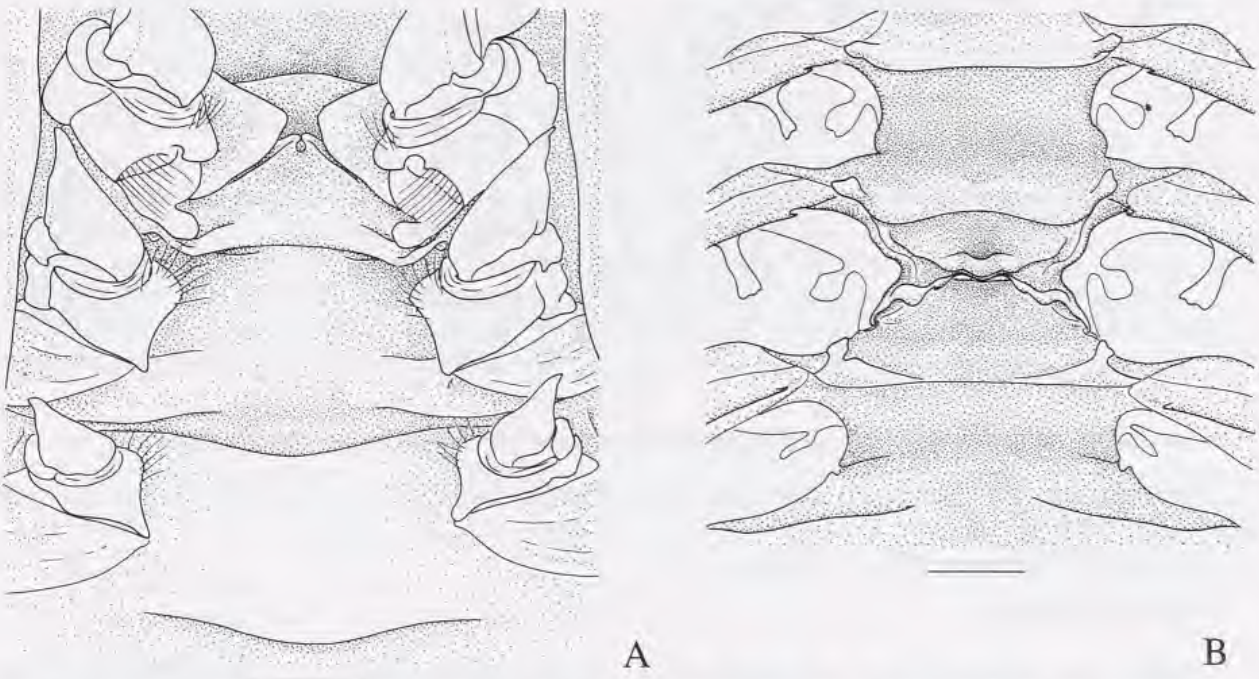

FIG. 136. — *Petalidium foliaceum*, ♀ 18 mm cl, South Pacific Ocean. **A**, Thelycum. **B**, Seminal receptacles, dorsal view. Scales = 1 mm.

Source : MNHN, Paris

Genus *Sergestes* H. Milne Edwards, 1830

Figures 137-139

Nika - Risso, 1816, Hist. nat. Crust. Nice, : 87 [part].

Sergestes H. Milne Edwards, 1830, Annls Sci. nat. Zool., 19: 346. — Krøyer, 1855, Vidensk. Selsk. Skr., (5)4: 219-234. — Bate, 1881, Ann. Mag. nat. Hist., (5)8: 171. — Ortmann, 1893, Ergebn. Plankton-Exped. Humboldt-Stift., 2: 29; 1898, Bronn's Kl. Ordn. Tierreichs, (5)2: 1121. — Hansen, 1896, Proc. zool. Soc. Lond., 1896: 936-970 [part]; 1903, Proc. zool. Soc. Lond., 1903(1): 53; 1919, Siboga Exped., 38: 2; 1922, Résult. Camp. scient. Prince Albert I, 64: 11. — Alcock, 1901, Descr. Cat. Indian Deep-Sea Crust., : 48. — Kemp, 1910b, Scient. Invest. Fish. Brch Ire., 1: 24. — Burkenroad, 1937a, Zoologica, N. Y., 22(25): 316. — Barnard, 1950, Ann. S. Afr. Mus., 38: 638. — Yaldwyn, 1957, Zoology Publs Vict. Univ. Coll., 22: 7. — Milne, 1968, Crustaceana, 14(1): 22. — Kensley, 1971a, Ann. S. Afr. Mus., 57(10): 230. — Crosnier and Forest, 1973, Faune Trop., 19: 305. — Burkenroad, 1983, Crust. Issues, 1: 283. — Squires, 1990, Can. Bull. Fish. Aq. Sci., 221: 47.

Placed on the Official List of Generic Names in Zoology, International Commission on Zoological Nomenclature, 1969, Opinion 864, Name No. 1824, Bull. zool. Nom., 25(4/5): 139.

Acheles Cocco, 1832, Eff. Scient. Lett. Sicilia, 2: 204. — Burkenroad, 1983, Crust. Issues, 1: 288. Type species: By monotypy, *Acheles arachnipodus* Cocco, 1832, Eff. Scient. Lett. Sicilia, 2: 204 [= *Sergestes corniculum* Krøyer, 1855]. Type locality: Messina, Sicily. [See Holthuis, 1977, for a discussion of this species]. Gender: Feminine.

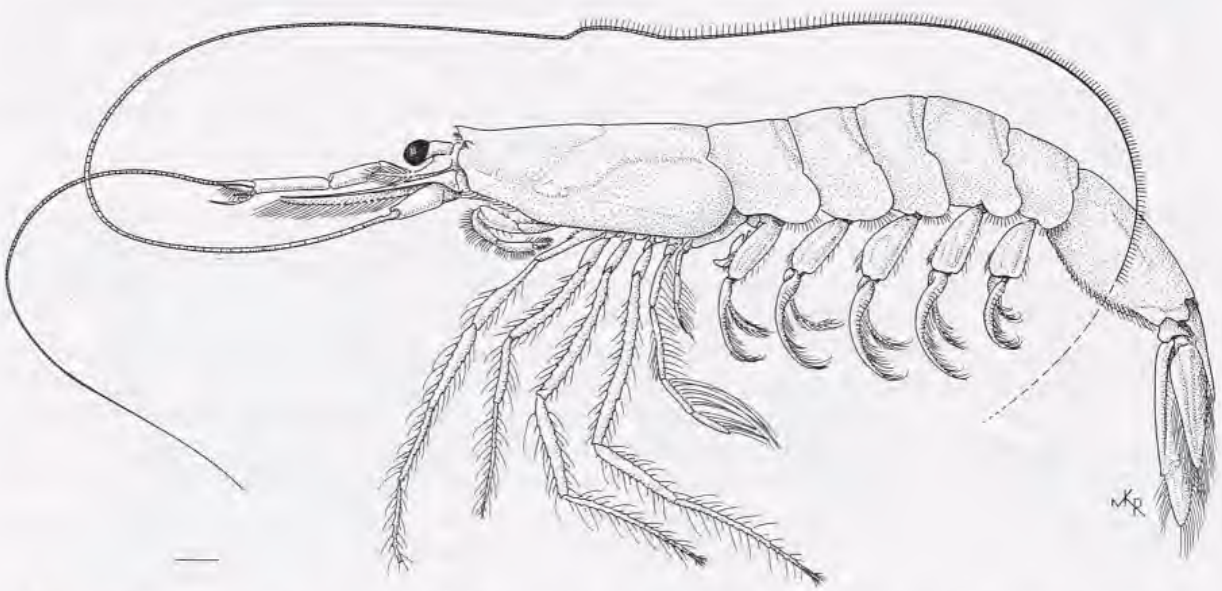

Fig. 137. — *Sergestes atlanticus*, ♂ 5.8 mm cl, Northwest Atlantic Ocean. Lateral view. Scale = 1 mm.

Type Species: By monotypy, *Sergestes atlanticus* H. Milne Edwards, 1830, Annls Sci. nat. Zool., 19: 349, pl. 10, figs. 1-9.

Type Locality: North Atlantic Ocean.

Gender: Masculine.

Diagnosis. — Integument moderately firm, lacking dermal photophores. Red subcuticular chromatophores mainly concentrated in anterior part of body. Rostrum short, barely extending beyond anterior margin of carapace, apically acute or rounded, with or without single dorsal

Source : MNHN, Paris

tooth. Carapace with supraorbital and hepatic spines present or absent in adults. Cervical sulcus well marked, reaching dorsal midline; postcervical sulcus, if present, reaching dorsal midline; rounded branchiocardiac carina usually present; rounded hepatic carina sometimes present. Gastrohepatic gland modified to form luminescent Organ of Pesta. Ovary in female confined to cephalothorax. Abdominal somites dorsally rounded, or sixth somite weakly carinate. Telson lacking lateral movable spines, tapering to subacute apex.

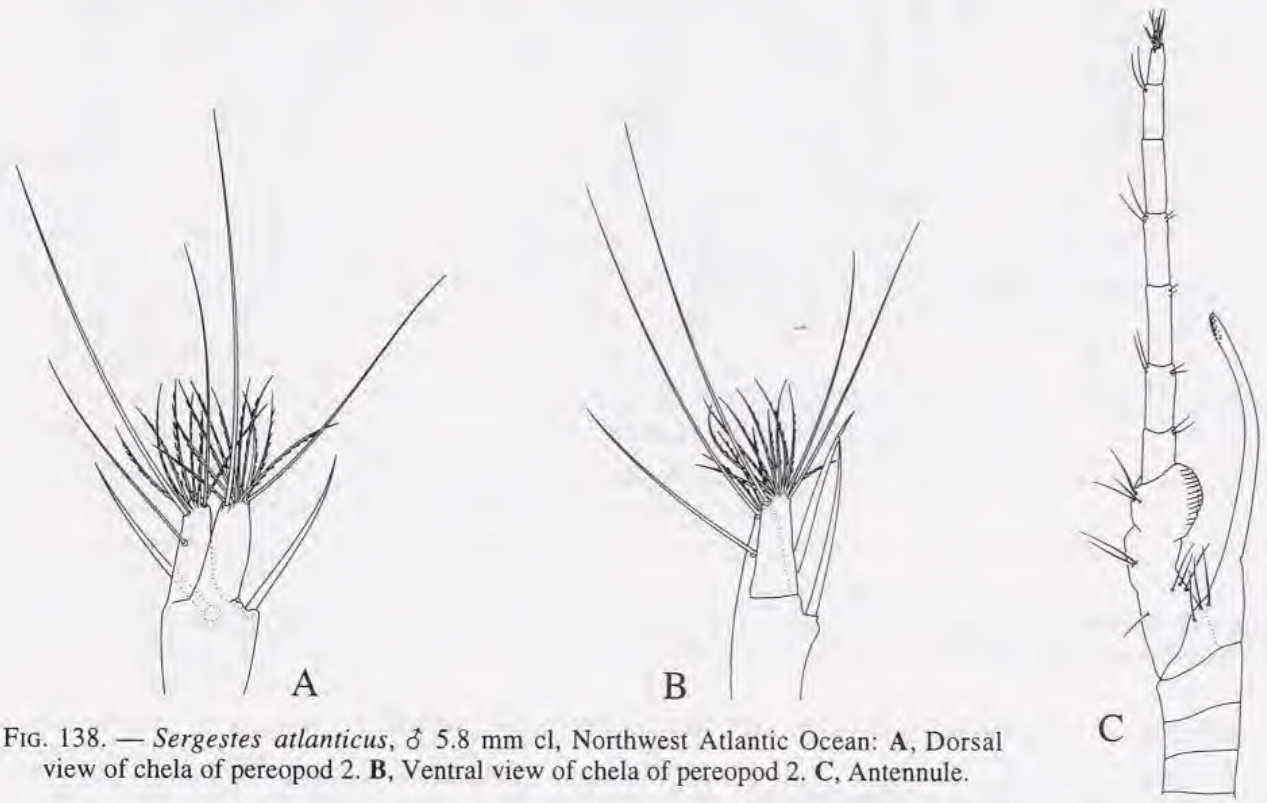

FIG. 138. — *Sergestes atlanticus*, ♂ 5.8 mm cl, Northwest Atlantic Ocean: **A**, Dorsal view of chela of pereopod 2. **B**, Ventral view of chela of pereopod 2. **C**, Antennule.

Eye with cornea well pigmented, wider than eyestalk. Third maxilliped either subequal in length to third pereopod, or markedly more robust and longer than third pereopod. First to third pereopods elongate, slender, bearing stiff setae; first pereopod lacking chela; second and third pereopods with minute chelae; fourth and fifth pereopods bearing natatory setae, consisting of 6 podomeres, dactyls lacking; fifth pereopod shorter than fourth pereopod, lacking gills.

Petasma with processus ventralis not forked. Thelycum with small sac-like seminal receptacles situated submesially at base of third pereopod, often connected by shallow transverse groove.

Distribution of branchiae, epipods, and exopods in the genus *Sergestes*.

Somite	VII (Mxp1)	VIII (Mxp2)	IX (Mxp3)	X (P1)	XI (P2)	XII (P3)	XIII (P4)	XIV (P5)
Pleurobranchiae	-	-	-	-	-	-	-	-
Arthrobranchiae	-	1	1+lam	1+lam	1+lam	2	2	-
Podobranchiae	-	-	-	-	-	-	-	-
Epipods	1	1	-	-	-	-	-	-
Exopods	1	-	-	-	-	-	-	-

Source : MNHN, Paris

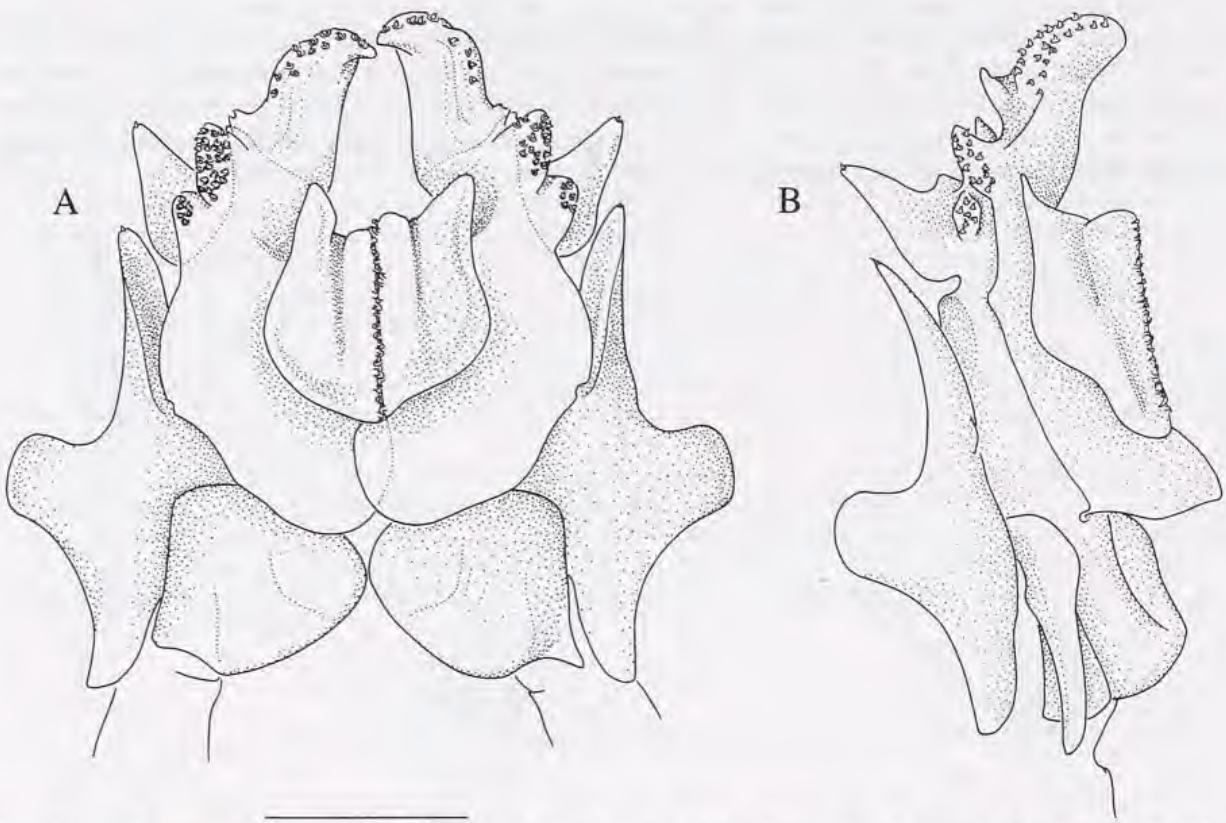

FIG. 139. — *Sergestes atlanticus*, ♂ 6.0 mm cl, Northwest Atlantic Ocean. **A**, Petasma, dorsal view. **B**, *Idem*, lateral view. Scale = 0.5 mm.

SPECIES. — *Sergestes arachnipodus* (Cocco, 1832). Bermuda; Mediterranean.

Sergestes arcticus Krøyer, 1855. Mediterranean; south-west Atlantic Ocean; south-east Atlantic Ocean; south-west Indian Ocean; south-east Australia; New Zealand.

Sergestes armatus Krøyer, 1855. Mediterranean; north Atlantic Ocean off Bermuda, Azores and Canary Islands; south-east Atlantic Ocean; south-west Indian Ocean; north-west Pacific Ocean.

Sergestes atlanticus H. Milne Edwards, 1830. Sargasso Sea; north-east Atlantic Ocean off Bermuda, Azores and Canary Islands; Mediterranean; south-east Atlantic Ocean; south-west Indian Ocean; eastern Australia; north-west Pacific Ocean.

Sergestes brevispinatus Judkins, 1978. Eastern Central Pacific Ocean.

Sergestes coalitus Burkenroad, 1940. Sulu Sea.

Sergestes consobrinus Milne, 1968. Northeastern Pacific Ocean off California, U.S.A. and Baja California, Mexico; north-west Pacific Ocean.

Sergestes cornutus Krøyer, 1855. Off Bermuda.

Sergestes curvatus Crosnier and Forest, 1973. North-east and south-east Atlantic Ocean, south-west Indian Ocean.

Sergestes diapontius Bate, 1881. North-east and south-east Atlantic Ocean; Gulf of Aden; Seychelles, Chagos Archipelago; Sri Lanka; Bay of Bengal.

Source : MNHN, Paris

Sergestes disjunctus Burkenroad, 1940. South-east Atlantic Ocean; south-west Indian Ocean; off New Zealand.

Sergestes edwardsi Krøyer, 1855. Off Bermuda; north-west Atlantic Ocean; Madeira; Cape Verde Islands; eastern Atlantic Ocean from Sierra Leone to Zaire.

Sergestes erectus Burkenroad, 1940. Off Baja California; off Hawaii; off Rarotonga Island, south-central Pacific Ocean; north-west Pacific Ocean.

Sergestes extensus Hanamura, 1983. Off Baja California.

Sergestes geminus Judkins, 1978. Eastern Central Pacific Ocean.

Sergestes gibbolobatus Judkins, 1978. Central equatorial Pacific Ocean.

Sergestes halia Faxon, 1893. Southern Baja California and Gulf of California; Gulf of Panama.

Sergestes hamifer Alcock and Anderson, 1894. Laccadive Islands.

Sergestes henseni (Ortmann, 1893). North and South Atlantic Ocean; Mediterranean.

Sergestes incertus Hansen, 1896. South-central Atlantic Ocean off Tristan da Cunha.

Sergestes index Burkenroad, 1940. Off New Zealand; north-west Pacific Ocean.

Sergestes nipponensis Yokoya, 1933. Japan.

Sergestes nudus Illig, 1914. North-eastern Atlantic Ocean from Madeira to Congo; Gulf of Aden; Seychelles; Chagos Archipelago; Cocos Islands; Bay of Bengal.

Sergestes orientalis Hansen, 1919. South-east Atlantic Ocean; south-west Indian Ocean; Red Sea; Indonesia; South China Sea; north-west Pacific Ocean.

Sergestes paraseminudus Crosnier and Forest, 1973. South-east Atlantic Ocean off Gabon, Congo, and Angola.

Sergestes pectinatus Sund, 1920. Off Baja California; Bermuda; Sargasso Sea; North-east Atlantic Ocean off Azores and Canary Islands; south-east Atlantic Ocean, south-west Indian Ocean; north-west Pacific Ocean.

Sergestes pediformis Crosnier and Forest, 1973. South-east Atlantic Ocean off Gabon, Congo, and Angola.

Sergestes pestafer Burkenroad, 1937a. Eastern Pacific Ocean from southern California and Gulf of California to Galapagos Islands.

Sergestes rubroguttatus Wood-Mason, 1891. Mediterranean; Arabian Sea; Bay of Bengal; Andaman Sea.

Sergestes sargassi Ortmann, 1893. Off Baja California; Sargasso Sea; Bermuda; North-east Atlantic Ocean off Azores and Canary Islands; Mediterranean; south-east Atlantic Ocean, south-west Indian Ocean; north-west Pacific Ocean.

Sergestes seminudus Hansen, 1919. Arabian Sea; Indonesia; eastern Australia; Japan; north-west Pacific Ocean.

Sergestes semissis Burkenroad, 1940. Northern Mozambique; Arabian Sea; Bay of Bengal.

Sergestes similis Hansen, 1903. North-east Pacific Ocean, Bering Sea; Baja California Sur and Gulf of California; south Pacific Ocean off Chile; eastern South Atlantic Ocean in Benguela Current.

Sergestes stimulator Burkenroad, 1940. Off New South Wales, Australia.

Sergestes tantillus Burkenroad, 1940. Off Galapagos Islands.

Sergestes verpus Burkenroad, 1940. Celebes Sea.

Sergestes vigilax Stimpson, 1860. Off Bermuda; Mediterranean; north-west Pacific Ocean.

Source : MNHN, Paris

Genus *Sergia* Stimpson, 1860

Figures 140-141

Sergestes - KRØYER, 1859, Vidensk. Selsk. Skr., (5)4: 219-234 [part]. — HANSEN, 1896, Proc. zool. Soc. Lond., 1896: 936 [part]; 1919, Siboga Exped., 38: 2 [part]; 1922, Résult. Camp. scient. Prince Albert I, 64: 11 [part]. — BARNARD, 1950, Ann. S. Afr. Mus., 38: 638 [part].

Sergia Stimpson, 1860, Proc. Acad. nat. Sci. Philad., 1860: 46. — ORTMANN, 1893, Ergebn. Plankton-Exped. Humboldt-Stift., 2: 37. — KEMP, 1910b, Scient. Invest. Fish. Brch Ire., 1: 24. — BURKENROAD, 1983, Crust. Issues, 1: 283, 288. — SQUIRES, 1990, Can. Bull. Fish. Aq. Sci., 221: 52. — VERESHCHAKA, 1994, Steenstrupia, 20(3): 73-95.

Sergestes (Sergia) - YALDWYN, 1957, Zoology Publs Vict. Univ. Coll., 22: 8. — KENSLEY, 1971a, Ann. S. Afr. Mus., 57(10): 230. — CROSNIER & FOREST, 1973, Faune Trop., 19: 306.

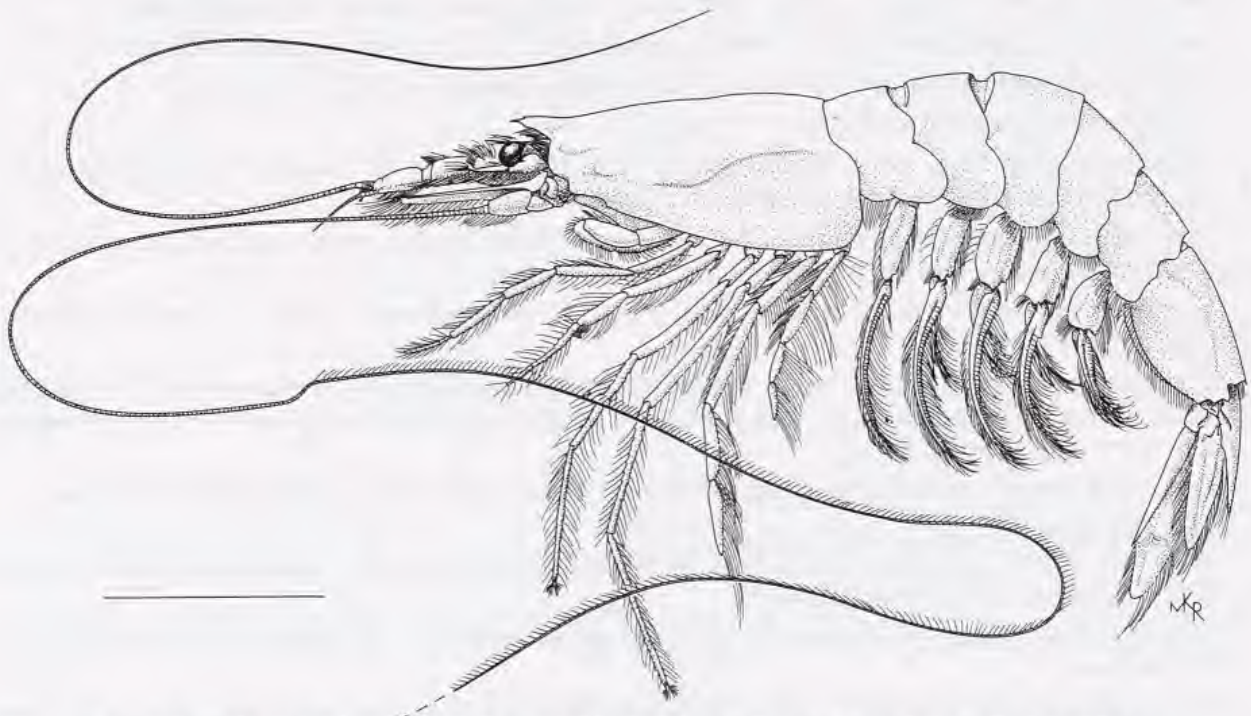

FIG. 140. — *Sergia robusta*, ♀ 12.5 mm cl, North Atlantic Ocean. Lateral view. Scale = 10 mm.

TYPE SPECIES: By monotypy, *Sergia remipes* Stimpson, 1860, Proc. Acad. nat. Sci. Philad., 1860: 46.

TYPE LOCALITY: Pacific Ocean, 27.5°N, 138.5°E. [The type species, *Sergia remipes*, was determined to be a late mastigopus stage by BURKENROAD (1945: 587, footnote). The latter author identified this mastigopus with the group of species in what was then the subgenus *Sergia* (see YALDWYN, 1957: 8)].

GENDER: Feminine.

DIAGNOSIS. — Integument very soft and thin to fairly firm; lacking or bearing photophores with or without cuticular lenses; red cuticular pigment distributed over entire body and appendages. Rostrum variable, short, never reaching cornea, apically acute or rounded, with or without single dorsal tooth. Carapace lacking supraorbital and hepatic spines in adult; secondary

Source : MNHN, Paris

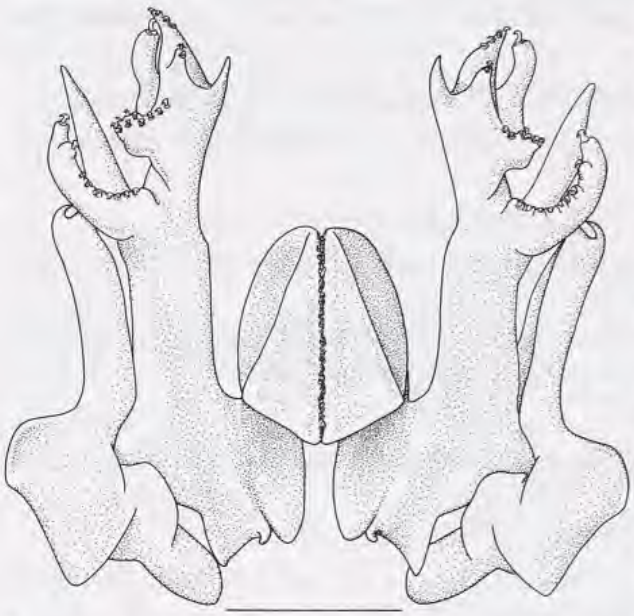

FIG. 141. — *Sergia robusta*, ♂ 17.0 mm cl, North Atlantic Ocean. Petasma, dorsal view. Scale = 1 mm.

hepatic prominences sometimes developed. Cervical sulcus usually well defined, reaching midline; postcervical sulcus often well defined, reaching midline; rounded branchiocardiac carina usually well marked; rounded hepatic-antennal carina sometimes present. Gastrohepatic gland not modified to form luminescent organ. Ovary in female sometimes extending into abdomen. Abdominal somites dorsally rounded. Telson lacking lateral movable spines, tapering to subacute apex.

Eye with cornea well pigmented, wider than eyestalk. First to third pereopods elongate, slender, bearing stiff setae; first pereopod lacking proper chela; second and third pereopods with minute chela; fourth and fifth pereopods of 6 segments bearing natatory setae, dactyl lacking; fifth pereopod shorter than fourth pereopod. Usually 7 branchiae per side, 8 in *S. grandis*, latter having podobranchia on second maxilliped.

Petasma with processus ventralis not forked. Thelycum having small, shallow seminal receptacles situated submesially at base of third pereopods, sometimes connected by shallow groove across sternite XII.

Distribution of branchiae, epipods, and exopods in the genus *Sergia*

Somite	VII (Mxp1)	VIII (Mxp2)	IX (Mxp3)	X (P1)	XI (P2)	XII (P3)	XIII (P4)	XIV (P5)
Pleurobranchiae	-	-	-	-	-	-	-	-
Arthrobranchiae	-	1	1+r	1+r	1+r	2	2	-
Podobranchiae	-	-	-	-	-	-	-	-
Epipods	1	1	-	-	-	-	-	-
Exopods	1	-	-	-	-	-	-	-

SPECIES. — *Sergia bigemmea* (Burkenroad, 1940). Baja California; north-west Pacific Ocean; off Tahiti; Hawaii.

Sergia bisulcata (Wood-Mason, 1891). Arabian Sea; Bay of Bengal; Indonesia; Philippines.

Sergia challengeri (Hansen, 1903). Seychelles; Indonesia; Fiji.

Sergia colosii (Cecchini, 1933). Red Sea.

Sergia extenuata (Burkenroad, 1940). Eastern Atlantic Ocean from Ivory Coast, Gabon, and Angola.

Sergia filicta (Burkenroad, 1940). Baja California; Gulf of Panama; north-west Pacific Ocean.

Sergia fulgens (Hansen, 1919). Indonesia.

Sergia gardineri (Kemp, 1913). Natal, South Africa; Seychelles; Indonesia; central Pacific Ocean; north-west Pacific Ocean.

Source : MNHN, Paris

Sergia grandis (Sund, 1920). North-west Atlantic Ocean from Grand Banks, Bermuda, Sargasso Sea, Surinam; North-east Atlantic Ocean to Cape Verde Islands; Azores; south-east Atlantic Ocean; southern Indian Ocean.

Sergia hansjacobi Vereshchaka, 1994. North Atlantic: Caribbean region and South America.

Sergia inequalis (Burkenroad, 1940). South-west Indian Ocean off Natal, South Africa; Java Sea; Japan; north-west Pacific Ocean.

Sergia inoa (Faxon, 1893). Indonesia; north-west Pacific Ocean.

Sergia japonica (Bate, 1881). Off Bermuda; Seychelles; Sri Lanka; Philippines; Japan; north-west Pacific Ocean; eastern Australia; New Zealand.

Sergia laminata (Burkenroad, 1940). Southern California, U.S.A.; Baja California; south-east Atlantic Ocean; south-west Indian Ocean; Madagascar; north-west Pacific Ocean.

Sergia lucens (Hansen, 1922). Taiwan; Japan.

Sergia maxima (Burkenroad, 1940). Baja California; northern Madagascar; Hawaii; New Zealand; north-west Pacific Ocean.

Sergia plumea (Illig, 1927). North-west Indian Ocean off Somalia.

Sergia potens (Burkenroad, 1940). South-east Atlantic Ocean; south-west Atlantic Ocean off Brazil and Argentina; south-west Indian Ocean; New Zealand.

Sergia prehensilis (Bate, 1881). South-east Atlantic Ocean off South Africa; Antarctic; south-west Indian Ocean; Japan; eastern Australia; north-west Pacific Ocean.

Sergia profunda (Bate, 1888). South-east Atlantic Ocean; south-east Pacific Ocean off Valparaiso.

Sergia regalis (Gordon, 1939). South-east Atlantic Ocean; south-west Indian Ocean; Japan; north-west Pacific Ocean.

Sergia robusta (Smith, 1882). Gulf of Mexico; Caribbean Sea; Surinam; North Sea; Faroe Islands; off Bermuda; Mediterranean; Cape Verde Islands to Congo and Angola.

Sergia scintillans (Burkenroad, 1940). Baja California; south-east Atlantic Ocean; south-west Indian Ocean; Sumatra; Hawaii; north-west Pacific Ocean.

Sergia splendens (Sund, 1920). Off Bermuda; Mediterranean; north-east and south-east Atlantic Ocean.

Sergia stellata (Burkenroad, 1940). South of Sri Lanka, Indian Ocean.

Sergia talismani (Barnard, 1947). Off Bermuda; north-east Atlantic Ocean from Cape Verde Islands to Portuguese Guinea, Gabon, Congo, Cabinda; south-west Indian Ocean; Japan.

Sergia tenuiremis (Krøyer, 1855). Off Bermuda; north-west Pacific Ocean.

Sergia wolffi Vereshchaka, 1994.Caribbean and Northeastern Atlantic.

Genus ***Sicyonella*** Borradaile, 1910

Figures 142-143

Aphareus Paulson, 1875, [Stud. Crust. Red Sea, 1: 123]. [Invalid junior homonym of *Aphareus* Cuvier and Valenciennes, 1830, Hist. Nat. Poissons, 6: 485]. Type species: By monotypy, *Aphareus inermis* Paulson, 1875, [Stud. Crust. Red Sea, 1: 123]. Type locality: Red Sea. Gender: Masculine.

Sicyonella Borradaile, 1910, Trans. Linn. Soc. Lond., (2) zool., 13(2): 259. — Hansen, 1919, Siboga Exped., 38: 27. — Burkenroad, 1937b, Ann. Mag. nat. Hist., (10)19: 505; 1983, Crust. Issues, 1: 283.

Source : MNHN, Paris

Placed on the Official List of Generic Names in Zoology, International Commission on Zoological Nomenclature, 1969, Opinion 864, Name No. 1825, Bull. zool. Nom., 25(4/5): 139.

Aphareocaris Calman, 1913, J. Linn. Soc. Lond., zool., 32: 219. Type species: *Aphareus inermis* Paulson, 1875, Izs. Rak. Kras. Mor. Chast. Kiev, 1: 117, by designation. [Name to replace *Aphareus* Paulson, 1875, preoccupied]. Type locality: Red Sea. Gender: Masculine.

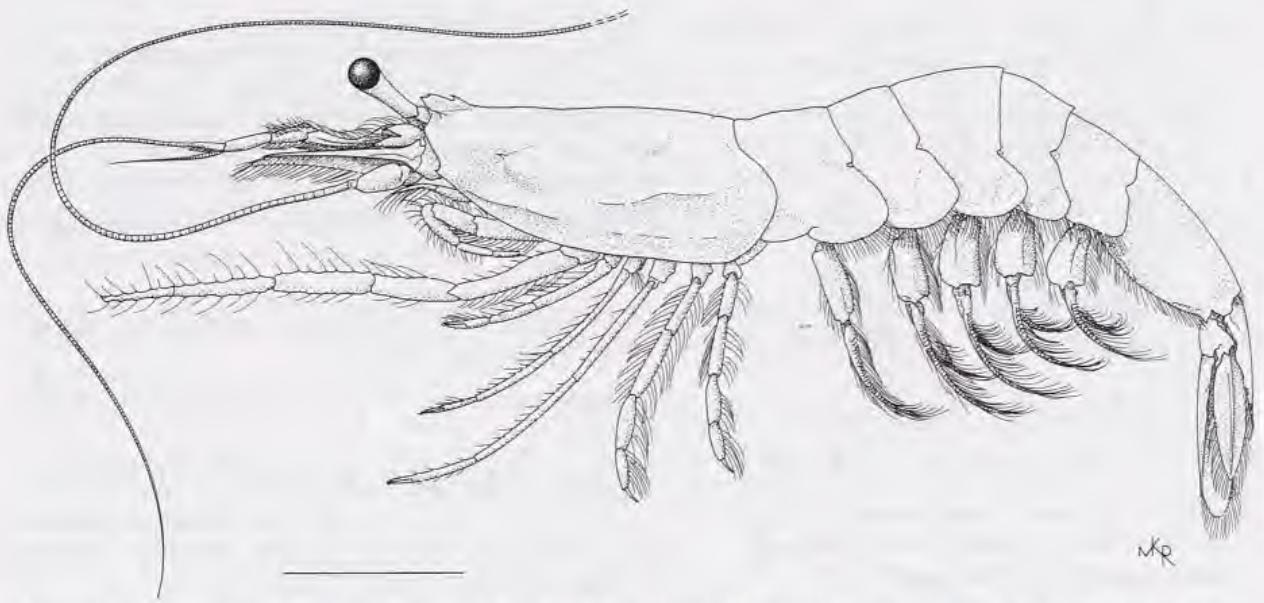

FIG. 142. — *Sicyonella maldivensis*, ♀ 8 mm cl, Bikini Atoll, Marshall Islands. Lateral view. Scale = 5 mm.

TYPE SPECIES: By monotypy, *Sicyonella maldivensis* Borradaile, 1910, Trans. Linn. Soc. Lond., (2) zool. 13(2): 259.

TYPE LOCALITY: Maldive Islands, Indian Ocean.

GENDER: Feminine.

DIAGNOSIS. — Integument moderately firm. Rostrum short, triangular, apically acute, with 2 dorsal teeth. Carapace with strong supraorbital and hepatic spines; cervical sulcus poorly defined, only laterally visible; rounded branchiocardiac carina well marked. Abdominal somites dorsally rounded. Telson with 4 pairs of lateral movable spines; apically spiniform, acute.

Eye with cornea with well developed pigment, wider than relatively elongate eyestalk. Third maxilliped more robust and longer than pereopods, armed with strong spines on posterior margin

Distribution of branchiae, epipods, and exopods in the genus *Sicyonella*

Somite	VII (Mxp1)	VIII (Mxp2)	IX (Mxp3)	X (P1)	XI (P2)	XII (P3)	XIII (P4)	XIV (P5)
Pleurobranchiae	-	-	-	-	-	-	-	-
Arthrobranchiae	-	-	1+r	1+r	1+r	1+r	2	-
Podobranchiae	-	1	-	-	-	-	-	-
Epipods	1	1	-	-	-	-	-	-
Exopods	1	-	-	-	-	-	-	-

Source : MNHN, Paris

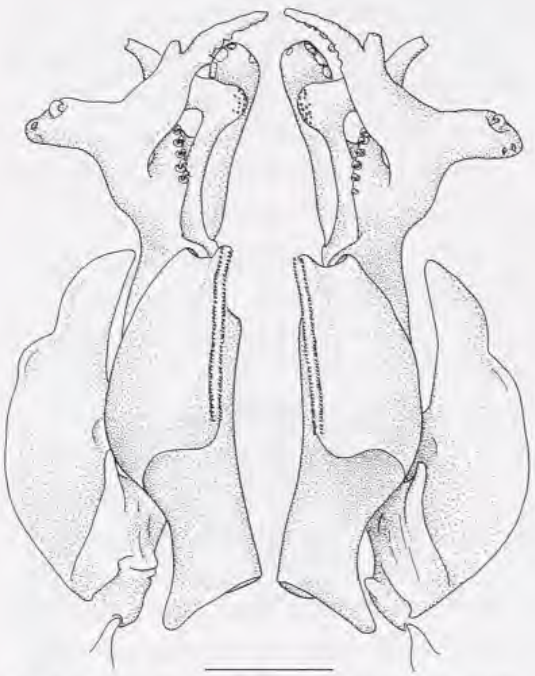

FIG. 143. — *Sicyonella maldivensis*, ♂ 6 mm cl, Bikini Atoll, Marshall Islands. Petasma, dorsal view. Scale = 0.5 mm.

of segments. First to third pereopods slender, increasing in length posteriorly, each bearing small distinct chela; fourth and fifth pereopods flattened, of 7 segments, somewhat broader than preceding pereopods, posterior margin of propod and carpus setose, anterior and posterior margins of merus and ischium setose; fifth pereopod shorter than fourth pereopod.

Petasma with lamellar processus uncifer, broad lobus armatus, strong processus ventralis distally divided into 2 lobes. Seminal receptacles broad, shallow, situated laterally at base of third pereopods, beneath broad subcircular flaps. Sternites of somites XIII and XIV in female gently convex.

SPECIES. — *Sicyonella antennata* Hansen, 1919. Indonesia; Thailand.

Sicyonella elegans Calman, 1913. Torres Straits.

Sicyonella inermis (Paulson, 1875). Red Sea.

Sicyonella maldivensis Borradaile, 1910. Red Sea; Cargados Carajos Shoals; Maldive Islands; Indonesia; Palau; Bikini Atoll.

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INDEX TO TAXA

Valid taxa are printed in bold. In the pagination the major entry for a taxon is in bold. Pages having figures of the taxa are given in italics.

A

acclivirostris, Parapenaeopsis 120
acclivis, Metapenaeopsis 104
Acetes 12, 184, **187**
Acheles 194
acuminata, Solenocera 180
aegyptia, Metapenaeopsis 104
affinis, Hadropenaeus *163, 164, 165*
affinis, Metapenaeus *109, 110, 111*
affinis, Penaeus 109
affinis, Sicyonia 155
africana, Solenocera 180
africana, Macropetasma *90, 91*, 92
africanus, Parapeneus 91
agassizii, Solenocera 180
akayebi, Erythropenaeus 102
akayebi, Parapenaeus 102
albicoma, Trachysalambria 148, 149
alcocki, Aristeus 40
alcocki, Metapenaeus 110
alfonso, Solenocera 180
algoensis, Solenocera 180
aliaffinis, Sicyonia 155
alticarinata, Solenocera 180
altus, Benthesicymus 60
Amalopenaeus 64
americanus, Acetes americanus 188
americanus, Parapenaeus 123
anchistus, Metapenaeus 110
anchoralis, Penaeus 144
anchoralis, Trachypenaeus *144, 145, 146*
andamanensis, Metapenaeopsis 104
angusta, Metapenaeopsis 104
annectens, Parasolenocera 179
annectens, Solenocera 180
antennata, Sicyonella 202
antennatus, Aristeus *40, 41*
antennatus, Penaeus 39
antillensis, Aristeus 41
Aphareocaris 201
Aphareus 200
aphoticus, Hymenopenaeus 172
arachnipodus, Acheles 194
arachnipodus, Sergestes 196
arafurica, Parapenaeopsis 120
Archipenaeopsis 102
arcticus, Sergestes 196
Aristaeidae 32
Aristaeina 32
Aristaeinae 32
Aristaeomorpha 12, 32, **33**, 34
Aristaeopsis 33, **36**, 43
Aristaeus 36, 39, 46, 50, 52
Aristeae 32
Aristeidae 12, 32, 33
Aristeinae 32
Aristeomorpha 34
Aristeopsis 36, 51
Aristeus 12, 33, 36, **39**, 50, 83
armatus, Aristeus 51
armatus, Benthesicymus 60
armatus, Plesiopenaeus 38, *50, 52*
armatus, Sergestes 196
aroaensis, Parapenaeopsis 120
Artemesia 12, 67, 69, **71**, 127
Artemisia 71
aspera, Trachysalambria 149
assimilis, Metapenaeopsis 104
atlantica, Parapenaeopsis 118, *119*, 120
atlanticus, Sergestes *194, 195, 196*
atlantidis, Solenocera 180
Atypopenaeus 12, 70, **73**, 74, 114
Atypopeneus 73
australiana, Solenocera 181
australiensis, Haliporoides sibogae 167
australiensis, Parapenaeus 123
australis, Acetes sibogae 189
Austropenaeus 12, 33, **41**
aztecus, Farfantepenaeus *77, 79*
aztecus, Penaeus brasiliensis var. 78

Source : MNHN, Paris

B

balboae, Pelagopenaeus *125, 126*
balboae, Penaeus 124
balli, Parapenaeopsis *116, 118, 120*
balssi, Penaeopsis 130
barbari, Gennadas 65
barbata, Metapenaeopsis 104
bartletti, Benthesicymus *59*, 60
barunajaya, Solenocera 181
bedokensis, Solenocera 181
beebei, Metapenaeopsis 104
bennettae, Metapenaeus 110
Bentheogennema 12, 56, **57**
Benthesicymae 56
Benthesicymidae 12, 32, **56**
Benthesicymina 56
Benthesicyminae 56
Benthesicymini 56
Benthesicymus 12, 56, **59**
Benthoecetes 59
Benthonectes 12, 56, **61**
benthophila, Sicyonia 155
bicornis, Atypopenaeus .. *73, 75, 76*, 77, 116
bigemmea, Sergia 199
binghami, Acetes 188
bispinosa, Sicyonia 155
bisulcata, Sergia 199
borealis, Bentheogennema 58
bouvieri, Gennadas 65
brasiliensis, Benthesicymus 60
brasiliensis, Farfantepenaeus 78, 79
brevicornis, Metapenaeus 111
brevirostris, Benthesicymus 60
brevirostris, Cryptopenaeus 211
brevirostris, Farfantepenaeus 78, 79
brevirostris, Gennadas 66
brevirostris, Sicyonia 155
brevispinatus, Sergestes 196
brevisuturae, Trachysalambria 148, 149
brucei, Mesopenaeus 176
burkenroadi, Bentheogennema 58
burkenroadi, Sicyonia 155
byrdi, Rimapenaeus 136, 138

C

californiensis, Farfantepenaeus 79
canaliculatus, Melicertus 68, 100, 101
Cancer 79, 87, 99, 153
capensis, Gennadas 66
caribaeus, Tanypenaeus *139, 140*, 141
carinata, Parartemesia 173, 177
carinata, Sicyonia *153, 154, 155*, 155
carinatus, Benthesicymus 60
carinatus, Cancer 153, 154
carolinae, Acetes americanus 188
carpenteri, Hemipenaeus 46
catherinae, Cryptopenaeus *158, 159*, 160
Ceratopenaeus 102
cereus, Benthesicymus 60
ceylonica, Metapenaeopsis 104
chacei, Hymenopenaeus 172
chacei, Lucifer 185
challengeri, Penaeopsis 130
challengeri, Sergia 199
chinensis, Acetes 188
chinensis, Fenneropenaeus 82
choprai, Solenocera 181
clavicarpus, Gennadas 66
clevai, Cryptopenaeus 160
coalitus, Sergestes 196
colosii, Sergia 199
comata, Solenocera 181
commensalis, Metapenaeopsis 104
complanata, Metapenaeopsis mogiensis 107
compressipes, Atypopenaeus 77, 114
compressipes, Penaeus 74
coniger, Metapenaeopsis 106
conjunctus, Metapenaeus 111
consobrina, Metapenaeopsis mogiensis .. 107
consobrinus, Sergestes 196
constrictus, Penaeus 135
constrictus, Rimapenaeus 138
corniculum, Sergestes 194
cornuta, Parapenaeopsis 120
cornutus, Sergestes 196
coromandelica, Parapenaeopsis stylifera *116, 118, 119*, 121
coruscans, Plesiopenaeus 52
costata, Metapenaeopsis 106
crassicornis, Solenocera 181
Crassipenaeus 158
crassipes, Aristeus 52
crassipes, Pseudaristeus *54, 55*
crassissima, Metapenaeopsis 106
crassus, Gennadas 66
crenatus, Benthesicymus 60
cristata, Sicyonia 155

Source : MNHN, Paris

cristatus, Haliporoides 167
crosnieri, Cryptopenaeus 160
Cryptopenaeus 12, **158**
cultirostris, Parapenaeopsis 120
curvatus, Sergestes 196
curvirostris, Haliporus 168, 169, 170
curvirostris, Penaeus 146, 147
curvirostris, Sicyonia 155
curvirostris, Trachysalambria .....
.....98, *147, 148, 149, 151*

D

dalei, Metapenaeopsis 106
dalli, Metapenaeus 111
danae, Funchalia 85
dearmatus, Atypopenaeus 74, 77, 114
debilis, Hymenopenaeus *171*, 172, *173*
demani, Metapenaeus demani 111
danae, Funchalia 85
Decapoda 31
Dendrobranchiata 15, 31
denticulata, Parapenaeus longipes forma....
....124
diapontius, Sergestes 196
difficilis, Metapenaeopsis 106
diomedeae, Faxonia 177
diomedeae, Haliporoides 167, 177
disdorsalis, Sicyonia 155
disedwardsi, Sicyonia *155*, 156
disjunctus, Sergestes 197
disparri, Sicyonia 156
distincta, Metapenaeopsis 106
dobsoni, Mangalura 108
dobsoni, Metapenaeus 108, 111
doris, Hymenopenaeus 172
dorsalis, Sicyonia 156
duorarum, Farfantepenaeus 78, 79
dura, Metapenaeopsis 106

E

eboracensis, Metapenaeus 111
eduardoi, Penaeopsis *129*, 130
edwardsi, Sergestes 197
edwardsiana, Aristaeopsis *37, 38*, 39
edwardsianus, Penaeus 37
elegans, Amalopenaeus 64
elegans, Gennadas *64*, 66
elegans, Metapenaeus 111
elegans, Sicyonella 202
endeavouri, Metapenaeus 111
ensis, Metapenaeus 110, 111
equalis, Hymenopenaeus 172
erectus, Sergestes 197
erythraea, Metapenaeopsis 106
erythraeus, Acetes 189
erythraeus, Parapenaeus fissuroides 123
Erythropenaeus 102
esculentus, Penaeus 133
Eusicyonia 153
evermanni, Metapenaeopsis 106
extensus, Sergestes 197
extenuata, Sergia 199

F

fallax, Sicyonia 156
faoe, Rimapenaeus 135, *136, 137, 138*
faoe, Trachypenaeus 135
faouzii, Metapenaeopsis 106
Farfantepenaeus 12, 68, **77**, 101, 131
fattahi, Hymenopenaeus 172
Faxonia 165, 177
faxoni, Lucifer 185
faxoni, Solenocera 181
Fenneropenaeus 12, 68, **79**, 80, 131
filicta, Sergia 199
filipes, Benthonectes *62, 63*
fissuroides, Parapenaeus fissuroides 123
fissurus, Parapenaeus 123
florea, Solenocera 181
foliacea, Aristaeomorpha *34, 35*, 36
foliaceum, Petalidium 191, *192, 193*
formosa, Sicyonia 156
formosus, Atypopenaeus *75*, 77
fulgens, Sergia 199
fulva, Trachysalambria 149
Funchalia 12, 67, 68, **82**, 124
Funchaliae 67
Funchaliinae 67
Funchalis 83
furcata, Sicyonia 156
furici, Hymenopenaeus 172
fusca, Metapenaeopsis 106
fuscina, Rimapenaeus 137, 139
fuscina, Trachypenaeus 69

Source : MNHN, Paris

G

gaillardi, Metapenaeopsis 106
galeata, Sicyonia 156
gallensis, Metapenaeopsis 106
gardineri, Sergia 199
geijskesi, Solenocera 181
geminus, Sergestes 197
Gennadas 12, 56, 57, 59, **63**
gerardoi, Metapenaeopsis 106
gibbolobatus, Sergestes 197
gilchristi, Gennadas 66
glacialis, Hepomadus 47, 48
gonospinifer, Megokris 96, 99
goodei, Metapenaeopsis 102, 104, 106
Gordonella 12, 157, **160**
gracilirostris, Panaeus 88
gracilis, Pseudaristeus 54, 55
gracillima, Parapenaeopsis 120
grandis, Sergia 200
granulosus, Megokris *95, 96, 97*, 99
granulosus, Penaeus 95
Grimaldiella 83
gurjanovae, Solenocera 181

H

Hadropenaeus 12, 158, **163**
halia, Sergestes 197
Haliporae 67
Haliporoides 12, 158, **165**
Haliporus .....
.. 12, 157, 160, 163, 165, **168**, 170, 174, 177
halli, Hymenopenaeus 173
halli, Solenocera 181
hamifer, Sergestes 197
hanseni, Lucifer 185
hansjacobi, Sergia 200
Hapalopoda 62
hardwickii, Parapenaeopsis 118, 120
hartii, Xiphopenaeus 150
hathor, Melicertus 102
Hemipenaeopsis 83
Hemipenaeus 12, 33, **43**, 45, 52
Hemipeneus 44
Hemypenaeus 44
henseni, Sergestes 197
Hepomadus 12, 33, **46**
Heteropenaeus 12, 68, **85**
Heteropeneus 85
hextii, Solenocera 181
hilarula, Metapenaeopsis 106
Hippolyte 153
hjorti, Benthesicymus 61
hobbsi, Metapenaeopsis 106
hungerfordi, Parapenaeopsis 120
Hymenopenaeus .....
..... 12, 158, 163, 165, 168, **170**, 174, 176
Hymenopeneus 171

I

incertus, Gennadas 66
incertus, Sergestes 197
incisa, Metapenaeopsis 106
incisa, Parapenaeopsis 120
index, Sergestes 197
indicus, Acetes *186, 187, 188*, 189
indicus, Fenneropenaeus *80, 81*, 82
indicus, Parapenaeus fissuroides 123
indicus, Penaeus 80
inequalis, Sergia 200
inermis, Aphareus 200, 201
inermis, Hepomadus 48
inermis, Sicyonella 202
inermis, Solenocera alfonso 180
inflexa, Sicyonia 156
ingentis, Sicyonia 156
inoa, Sergia 200
insolitus, Metapenaeus 111
intermedia, Bentheogennema *57, 58, 61*
intermedia, Metapenaeopsis mogiensis .....
..... 107
intermedius, Acetes 189
intermedius, Gennadas 57
intermedius, Lucifer 185
intermedius, Metapenaeus 111
investigator, Hapalopoda 62
investigatoris, Benthesicymus 61
investigatoris, Parapenaeus 124
iridescens, Benthesicymus 61
ivanovi, Metapenaeopsis 106

J

japonica, Sergia 200
japonica, Sicyonia 156

Source : MNHN, Paris

japonicus, Acetes 189
japonicus, Marsupenaeus *93, 94*
japonicus, Penaeus canaliculatus var..... 92
jerryi, Penaeopsis 130
johni, Acetes 189
joyneri, Metapenaeus 112

K

kathleenae, Pseudaristeus *53, 54, 55*
kempi, Gennadas 66
kensleyi, Gordonella *161, 162*
kerathurus, Cancer 100
kerathurus, Melicertus 15, *100, 101*, 102
kishinouyei, Metapenaeopsis 106
koelbeli, Solenocera 182
krishnatrii, Metapenaeus 112
kroyeri, Xiphopenaeus *150, 151*, 152
kutchensis, Metapenaeus 112
kyushuensis, Metapenaeopsis 106

L

laciniatus, Benthesicymus 61
laevigata, Sicyonia 156
laevis, Hymenopenaeus 173
laevis, Sicyonia 156
lamellata, Metapenaeopsis 106
laminata, Sergia 200
lanceolatus, Parapenaeus 124
lancifer, Sicyonia 156
lata, Metapenaeopsis 106
latisulcatus, Melicertus 102
laubieri, Metapenaeopsis 106
Leptopenaeus 102
Leucifer 183
Leuciferidae 183
Leuciferinae 183
lindae, Metapenaeopsis 106
Litopenaeus 12, 15, 16, 68, **87**, 89, 128
liui, Metapenaeopsis 106
longicauda, Sicyonia 156
longimanus, Heteropenaeus 85, *86, 87*
longinaris, Artemesia *71, 72*, 73
longipes, Parapenaeus 121, 124
longipes, Trachysalambria 149
longirostris, Metapenaeopsis provocatoria 107
longirostris, Parapenaeus 121, *122, 123*, 124
longirostris, Penaeus 121
longistylis, Melicertus 102
lucasii, Hadropenaeus 164, 176, 179
lucasii, Philonicus 176, 179
lucens, Sergia 200
Lucifer 12, **183**
Luciferidae 12, 182, **183**
Luciferinae 183
lysianassa, Metapenaeus 112

M

mabahissae, Aristeus 41
macleayi, Metapenaeus 112
Macropetasma 12, 67, 69, **90**
madagascariensis, Haliporoides sibogae 167
Malacostraca 31
malaiana, Trachysalambria 148, 149
maldivensis, Sicyonella *201, 202*
Mangalura 108
mannarensis, Metapenaeopsis 107
manningi, Metapenaeopsis 107
marginatus, Melicertus 100, 102
mariae, Mesopenaeus 176
marinus, Acetes 189
marquesas, Metapenaeopsis 107
Marsupenaeus 12, 68, 82, **92**
martinella, Metapenaeopsis 107
martini, Sicyonia 156
mascarensis, Solenocera 182
maxillipedo, Parapenaeopsis 120
maxima, Sergia 200
Megokris 12, 70, **95**, 99, 138, 146
melantho, Solenocera 182
Melicertus ... 12, 15, 68, 77, 92, **99**, 100, 131
membranacea, Solenocera *179, 181*, 182
membranaceous, Penaeus 179
menoui, Metapenaeopsis 107
merguiensis, Fenneropenaeus 81, 82
Mesopenaeus 12, 158, **173**
Metapenaeopsis 12, 69, 102
Metapenaeus 12, 69, 76, 102, **108**, 127, 141, 146
Metapeneopsis 102

Source : MNHN, Paris

Metapeneus 102, 109, 117
miersi, Metapenaeopsis *103, 105*, 107
miersi, Penaeopsis 103
mineri, Metapenaeopsis 107
minicoyensis, Trachypenaeopsis 143
mixta, Sicyonia 156
Miyadiella 12, 70, **112**
mobilispinis, Metapenaeus 142
mobilispinis, Trachypenaeopsis .....
.....*141, 142, 143*
modestus, Hadropenaeus 165
modestus, Hymenopenaeus 163
mogiensis, Ceratopenaeus 102
mogiensis, Metapenaeopsis mogiensis 107
mogiensis, Parapenaeus 102
monoceros, Metapenaeus 112
monodon, Penaeus 130, *131*, *132*, 133
moosai, Solenocera 182
moyebi, Metapenaeus 112
muelleri, Pleoticus. 163, 173, 177, 178, 179
mulleri, Philonicus 163, 177, 179
murrayi, Parapenaeus 124
mutator, Solenocera 182

N

nana, Parapenaeopsis 121
nasica, Sicyonia 156
natalensis, Acetes 189
nebulosa, Sicyonia 156
necopina, Solenocera 182
Neopenaeopsis 121
neptunus, Hymenopenaeus 173
nereus, Hymenopenaeus 173
Nika 194
nipponensis, Sergestes 197
nitidus, Austropenaeus *42, 43*
nitidus, Plesiopenaeus 38, 41, 42
nodosa, Parapenaeus australiensis forma....
..... 123
notialis, Farfantepenaeus 79
novaeguineae, Metapenaeopsis 107
nudus, Sergestes 197

O

obesum, Petalidium 193
obliquirostris, Hymenopenaeus 173
ocellata, Sicyonia 156
occidentalis, Litopenaeus 90
ocularis, Penaeopsis 165, 177
olgae, Sicyonia 156
ommanneyi, Sicyonia 156
orientalis, Lucifer 185
orientalis, Sergestes 197
ornata, Miyadiella *113*, 114, *115*

P

pacificus, Rimapenaeus 139
Palaemon 153
pallidicauda, Aristeus 41
palmensis, Metapenaeopsis 107
Panaeus 88
Paneus 77
papuensis, Metapenaeus 112
paradoxus, Neopenaeopsis 121
parafallax, Sicyonia 156
paraguayensis, Acetes 189
Parahaliporus 165
Parahepomadus 12, 33, **48**
parahilarula, Metapenaeopsis 107
parapalmensis, Metapenaeopsis 107
Parapenaeinae 67, 157
Parapenaeopsis 12, 16, 70, 73, 102, **117**
Parapenaeus 12, 69, 102, **121**, 127, 135
Parapeneopsis 117
Parapeneus 90, 121, 127
Parartemesia 173, 177
paraseminudus, Sergestes 197
Parasolenocera 179
paravillosa, Gordonella *162*
parri, Sicyonia 156
parvula, Sicyonia 156
parvus, Gennadas 64, *65*, 66
Pasiphodes 64
pasithea, Bentheogennema 59
paulensis, Farfantepenaeus 79
pectinata, Solenocera 163, 176, 182
pectinatus, Gennadas 66
pectinatus, Philonicus 163, 176
pectinatus, Sergestes 186, 197
pectinulata, Solenocera 182
pediformis, Sergestes 197
pedunculata, Miyadiella 112
Peisos 12, 186, 187, **189**
Pelagopenaeus 12, 68, **124**

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Penaeidae 12, 32, 56, **67**, 152, 157
Penaeidea 184
Penaeinae 67
Penaeoidea 12, 31
Penaeopsis 12, 69, 102, 109, 117, **126**, 141, 165
Penaeus 12, 33, 36, 39, 68, 73,77, 80, 83, 87, 92, 95, 99, 102, 108, 112, 117, 121,124, 126, **130**, 135, 141, 144, 146, 149, 178
Penedia 67
Peneinae 157
Peneopsis 127
Peneus 77, 79, 88, 92, 99, 109, 117, 121, 124, 127, 130, 135, 144, 146, 178
penicillata, Sicyonia 156
penicillatus, Fenneropenaeus 82
penicillifer, Lucifer 185
Penoeus 102, 130
perezfarfantae, Parapenaeus 124
persica, Metapenaeopsis 107
pescadoreensis, Megokris *98*, 99
pestafer, Sergestes 197
Petalidium 12, 187, **191**
petrunkevitchi, Peisos *189, 190, 191*
philippii, Metapenaeopsis 107
philippi, Solenocera 179
philippii, Penaeus 102
Philippinensis, Leptopenaeus 102
Philonicus 163, 176, 177, 179
phuongi, Solenocera 182
picta, Sicyonia 156
plebejus, Melicertus 102
Pleoticus 12, 128, 158, 163, **176**, 179
Plesiopenaeus 12, 33, 38, 41, 43, **50**, 51
Plesiopeneus 36, 51
plumea, Sergia 200
Plyonuria 67
podophthalmus, Miyadiella ... *113*, 114, *115*
podophthalmus, Penaeus 112
politus, Parapenaeus 122, *123*, 124
polyarthra, Gordonella *160*, 161
potens, Sergia 200
precipua, Protrachypene *133, 134, 135*
prehensilis, Sergia 200
profunda, Sergia 200
propinqua, Metapenaeopsis 107
propinquus, Gennadas 66
propinquus, Hymenopenaeus 173
protensis, Pseudaristeus 55
Protrachypene 12, 67, 69, **133**
provocatoria, Metapenaeopsis provocatoria 107
proxima, Metapenaeopsis 107
Pseudaristeus 12, 33, **52**
pubescens, Metapenaeopsis 103
pubescens, Penaeus 103
purpureus, Pasiphodes 64

Q

quadrilobata, Metapenaeopsis 107
quinquedentata, Metapenaeopsis 107

R

rathbunae, Solenocera 182
rectacuta, Penaeopsis 128, 130
rectirostris, Sicyonia 156
regalis, Sergia 200
remipes, Sergia 198
richardi, Grimaldiella 83
richeri, Metapenaeopsis 107
richtersii, Trachypenaeopsis 144
Rimapenaeus 12, 70, 99, **135**, 138, 148, 151
robusta, Sergia *198, 199*, 200
robustus, Pleoticus 165, *176*, 177, *178*
rosea, Metapenaeopsis 107
rostridentatus, Aristeus 34
ruberoculatus, Parapenaeus 124
rubroguttatus, Sergestes 197
Ruvulus 153

S

sagamiensis, Funchalia 84, 85
Salambria 99
sargassi, Sergestes 197
schmitti, Litopenaeus 90
scintillans, Sergia 200
scotti, Metapenaeopsis 107
sculpta, Sicyonia 153, 154
sculptilis, Parapenaeopsis 121
scutatus, Gennadas 66
sedili, Megokris *98*, 99
semidentatus, Aristeus 41
seminudus, Sergestes 197
semissis, Sergestes 197

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semisulcatus, Penaeus 133
Sergestes 12, 186, 187, 191, **194**, 198
Sergestidae 12, 182, **185**, 187
Sergestinae 185
Sergestoidea 12, 31, **182**
Sergia 12, 186, 187, **198**
serrata, Penaeopsis *127, 128, 129*, 130
serratus, Penaeopsis 127
serrulatus, Acetes 189
setiferus, Litopenaeus 15, *88, 89*, 90
sewelli, Hymenopenaeus 173
sextuberculatus, Parapenaeus 124
seymouri, Benthesicymus 61
sibogae, Acetes sibogae 189
sibogae, Haliporoides sibogae 167
sibogae, Haliporus 165
sibogae, Metapenaeopsis 107
sibogae, Parahaliporus 165
sibogae, Pseudaristeus 55
sibogalis, Acetes sibogae 189
Sicyonella 12, 186, 187, **200**
Sicyonia 12, 83, **153**
Sicyonidae 152
Sicyoniidae 12, 32, **152**
Sicyoninae 152
silasi, Fenneropenaeus 82
similis, Rimapenaeus 137, 139, 151
similis, Sergestes 197
sinensis, Crassipenaeus 158
sinensis, Cryptopenaeus 160
sinica, Metapenaeopsis 108
sinica, Parapenaeopsis 121
sinuosa, Metapenaeopsis 108
siphonoceros, Penaeus 179
smithi, Metapenaeopsis 108
Solenocera 12, 158, 163, **178**
Solenoceridae 12, 32, **157**
Solenocerina 157
Solenocerinae 157
sordidus, Gennadas 66
spatulata, Metapenaeopsis 108
speciosus, Pseudaristeus 55
spinajugo, Solenocera 182
spinicauda, Hadropenaeus 165
spinidorsalis, Hemipenaeus *44, 45*, 46
spiridonovi, Metapenaeopsis 108
splendens, Sergia 200
stebbingi, Metapenaeus 112
steindachneri, Pleoticus 178
stellata, Sergia 200
stenodactylus, Atypopenaeus *74, 75, 76*, 77, 114
stenodactylus, Penaeus 114
stephani, Metapenaeus demani 111
stephenseni, Bentheogennema 59
stimpsoni, Sicyonia 156
stimulator, Sergestes 197
stokmani, Metapenaeopsis 108
strabus, Benthesicymus 61
stridulans, Metapenaeopsis 108
stylifera, Parapenaeopsis 69
stylifera, Parapenaeopsis stylifera 121
styliferus, Penaeus 117
stylirostris, Litopenaeus 89, 90
subtilis, Farfantepenaeus 79
suluensis, Metapenaeus 112
suspiriosum, Petalidium 193
Synhimantites 153

T

taaningi, Funchalia 85
talismani, Gennadas 66
talismani, Sergia 200
tanneri, Benthesicymus 61
tantillus, Sergestes 197
Tanypenaeus 12, 70, **139**,
taprobanensis, Haliporus *168, 169, 170*
tarawensis, Metapenaeopsis 108
tchekunovae, Metapenaeopsis 108
tenella, Metapenaeopsis 108, 121
tenella, Parapenaeopsis 121
tener, Hepomadus *46, 47*, 48
tenuipes, Metapenaeus 112
tenuiremis, Sergia 200
thetis, Haliporus 169, 170
tigrinus, Melicertus 100
tinayrei, Gennadas 66
tirmiziae, Benthesicymus 61
toloensis, Metapenaeopsis 108
Trachypenaeopsis 12, 69, **141**
Trachypenaeus 12, 70, 95, 97, 99, 117, 135, 138, **144**, 146
Trachypeneopsis 141
Trachypeneus 95, 135, 144, 146
Trachysalambria 12, 70, 97, 99, 135, 138, **146**
Transolenocera 179
triarthrus, Haliporoides 165

Source : MNHN, Paris

triarthrus, Haliporoides triarthrus 167
trispinosa, Sicyonia 156
trisulcatus, Penaeus 101
tropicalis, Mesopenaeus . *174, 175*, 176, 177
tropicalis, Parartemesia 174, 177
truncata, Sicyonia 157
tuerkayi, Hymenopenaeus 173
typica, Sicyonia 157
typicus, Synhimantites 153
typus, Leucifer 183
typus, Lucifer *184*, 185

U

uncta, Parapenaeopsis 121
urinator, Benthesicymus 61

V

vaillanti, Metapenaeopsis 108
valens, Gennadas 64, 66
vannamei, Litopenaeus 89, 90
vannamei, Penaeus 88
varidens, Aristeus 41
vaubani, Parahepomadus *48, 49*, 50
velutina, Metapenaeopsis 108
venusta, Parapenaeopsis 121
verpus, Sergestes 197
vestitus, Archipenaeopsis 102
vigilax, Sergestes 197
villaluzi, Trachysalambria 149
villosa, Funchalia 85
villosa, Gordonella *160*, 162
villosus, Haliporus 161
villosus, Hemipenaeopsis 83
vioscai, Solenocera 182
virilis, Aristeus 41
vitulans, Sicyonia 157
vniroi, Haliporoides triarthrus *166, 167*
vulgaris, Acetes 189

W

waltairensis, Solenocera 182
wellsi, Metapenaeopsis 108
wheeleri, Sicyonia 157
wolffi, Sergia 200
woodmasoni, Aristaeomorpha 36
woodwardi, Funchalia *82, 83, 84*, 85

X

Xiphopenaeus 12, 70, 140, **149**, 150
Xiphopeneus 149

Z

zarenkovi, Solenocera 182

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This work presents a study of the taxonomy of the penaeidean shrimps of the world. This group of shrimp includes many of the commercially important marine species of the tropics and subtropics, as well as many of the species that constitute a major link in the food chain of the oceans. The works present keys for the identification of seven families (the Aristeidae, Benthesicymidae, Penaeidae, Sicyoniidae, Solenoceridae, Luciferidae, and Sergestidae) and 56 genera, as well as diagnoses that attempt to define these taxa with scientific clarity. Also included are lists of the species and subspecies currently included in these genera, along with their geographic distribution, and a full bibliography.

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